

## **Title: Slope – Using a Multi–Sensory Approach**

### **Brief Overview:**

This lesson allows students to build the understanding of what slope means for a linear function. The target population is secondary struggling learners, grade levels 6–12. Students will share knowledge about slope and the lessons will give a multi–sensory approach to the mastery of determining slope of a line given its graph or two points on it.

### **NCTM Content Standard/National Science Education Standard:**

- Determine the slope of a line given two points on it.
- Determine the slope of a line given its graph.
- Compare the slopes of two lines.
  - Graphically by viewing the steepness
  - Algebraically by viewing the slope values

### **Grade/Level:**

Grades 9 – 12, Algebra (Secondary struggling learners needing more exposure with a multiple sensory approach)

### **Duration/Length:**

Three– 55–minute lessons

### **Student Outcomes:**

Students will:

- Understand the meaning of slope for a line.
- Calculate the slope of a line given two points on it.
- Calculate the slope of a line given its graph.
- Compare the slopes of two lines.

### **Materials and Resources:**

- Geoboards
- Rubber bands
- Dry Erase Boards / Pens
- Calculator
- Colored pencils
- Rope/string
- Worksheets
  - Vocabulary Cards
  - Vocabulary Report
  - GeoBoards Practice
  - Geoboards Exit Ticket
  - Geoboards Homework
  - Slopin’ It Up Warm– up
  - Coordinate Grid Transparency

- Four Corners Activity – Slopes
- Four Corners Activity – Graphs
- Hot Seat – Teacher Instructions
- Hot Seat – Student Record Sheet
- Hot Seat – Exercises
- Steppin’ It Up Homework
- Warm-up (lesson 3)
- Scavenger Hunt
- Scavenger Hunt Student Record Sheet
- Slope Application
- Slope Quiz

### **Development/Procedures:**

#### **Lesson 1**

**Preassessment** – Prior to the start of class, cut up the “Vocabulary Cards” and laminate them. Make enough cards so each student will be given a vocabulary card. Note that more cards may need to be created, or multiple sets of cards will need to be made. Instruct the students to find another student(s) with same vocabulary word and together discuss how the word relates to slope. After a brief student discussion, each vocabulary group will report out to class. The students should complete the “Vocabulary Report” chart as each group presents.

**Launch** – Students will use rubber bands on Geoboards to develop the concept of positive slope with a positive "rise" and positive "run." The line formed by looping the beginning point and end point with a rubber band would be the line that has the particular slope value. Lines with negative slopes, zero slope, and no slope will also be developed using rubber bands on the Geoboards.

**Teacher Facilitation** – Based on student input from the vocabulary card activity, the teacher will give a definition of slope. Students will copy on their vocabulary sheet the word, the definition and examples for slope.

Using the teacher GeoBoard transparency on the overhead, demonstrate a positive slope. The teacher will use colored overhead pens to correspond to the colored rubber bands. Starting from any point, use one green rubber band and stretch a positive rise. Using a red band starting from the last peg from the rise, stretch the red band for a positive run. Repeat the same rise and run from the last point. A black band will be used to connect the beginning rise point to the end of the second run point to show the given slope. (green = vertical/rise, red = horizontal/run, black = slope) Continue with the exploration using the following

combinations: a) positive rise, positive run, b) positive rise, negative run, c) negative rise, positive run d) negative rise, negative run. More examples will be done with emphasis on the order of this process: always rise first, and then run to form a line. Then the orientation of the line determines the slope's sign: positive, negative, zero or undefined slope.

Distribute the worksheet “GeoBoards–Practice”.

Divide the class into pairs. Use a large area of tiled floor to represent a coordinate grid system. Instruct the students as follows;

1. Have the pairs of students find a spot where four tiles intersect.
2. Have one student stand holding the end of a rope, representing the “starting point”.
3. Call out slope value and second student with other end of rope moves the appropriate rise and run of slope using the tile intersections.
4. Tell the students to stretch the rope taut, representing a line with the given slope.

Repeat exercise several times with different slopes including positive and negative values, as well as zero and undefined/no slope. Check for understanding by looking at the lines formed by the students. Pairs having trouble will not form a line parallel to the others. Consider extending the lesson by having the students draw the conclusion that parallel lines have the same slope.

**Student Application** – Upon completion of the day's lesson, the students will have discovered through the multi-sensory activities how to determine the slope (GeoBoards, GeoBoard Practice, Tiles on floor, Exit Ticket, Homework). If an error has been made, the teacher and/or partner can assist in obtaining a correct response.

**Embedded Assessment** – Each student will record the definition and examples of slope. Students will draw lines with the assigned slopes and determine the slopes of given lines. Students will form lines with a partner given specified slopes.

Each student will distinguish between a positive, negative, zero and undefined slope. Formally assess the students with the “Geoboards Exit Ticket”, where the students will determine the slope of four given lines.

To reinforce this concept, the students will receive a worksheet, “Geoboards Homework”, to determine the slope given two points or the line given one point and a slope.

#### Reteaching/Extension

- If students have difficulty with an activity, pair the student (with instructor or another student) to complete the activity.
- If student has achieved mastery of an activity quickly, give more difficult slopes and/or pair with another student to give peer assistance.

#### Lesson 2

Preassessment – Have the students complete the warm– up “Slopin’ It Up” to determine slope given two points on a line on a coordinate plane, as well as write the meaning of slope. Set a five minute limit for this activity. Review the homework for correctness and discuss any misunderstandings.

Launch – Prior to the start of class, hand the slopes from “Four Corners Activity – Slope” in four separate corners of the room. Cut up the graphs from “Four Corners Activity – Graphs”, and laminate if desired. Give each student one graph and have them determine the slope of the line. Instruct the students to go to the corner of the room where the slope of their line is posted. Discuss the similarities and differences amongst the graphs and the corresponding slopes.

Teacher facilitation – Use the overhead Geoboard to review the rise/run counting method to find slope. Project “Coordinate Grid Transparency” under the GeoBoard, on the overhead projector, and identify two ordered pairs on a line. Ask how to relate rise and run to the coordinate values, and lead the students into discovering the slope formula. Repeat with different ordered pairs as needed.

Collect and shuffle the cards from the “Four Corners Activity – Graphs”. Distribute the cards, one per student. Instruct the students to do the following:

- Write the coordinate pair for each point given.
- Calculate the slope of the line using the coordinate values.
- Based on the calculated slope value using the formula, students will stand in the matching value corner.

Discuss with the students how the slope can be determined two different ways: rise/run and change of  $y$  values divided by change of  $x$  values (formula). Point out to students that it is helpful to write the coordinate pairs vertically like a subtraction problem.

$$\begin{array}{r}
 (x, y) \\
 (9, 7) \\
 - (3, 5) \\
 \hline
 \end{array}
 \rightarrow
 \begin{array}{|c|c|}
 \hline
 (x, y) \\
 (9, 7) \\
 (3, 5) \\
 \hline
 \end{array}
 \rightarrow
 \begin{array}{|c|c|}
 \hline
 (x, y) \\
 (9, 7) \\
 (3, 5) \\
 \hline
 \begin{array}{cc}
 6 & 2 \\
 \text{Change} & \text{Change} \\
 \text{in } x & \text{in } y
 \end{array} \\
 \hline
 \end{array}$$

$$\text{Slope} = m = \frac{\text{Change in } y}{\text{Change in } x} = \frac{2}{6} = \frac{1}{3}$$

Continue the discussion of determining slope by viewing a graph and by given ordered pairs using several examples. Be sure to include examples of positive, negative, 0, and no slope.

Examples: (1,1) (2,2)  $m=1$     (-1,2) (1,-2)  $m=-2$   
 (3,3) (-2,3)  $m=0$     (-1,3) (-1,-3)  $m=\text{undefined}$   
 (4,-4) (6,4)  $m=2$     (-1,-2) (1,-8)  $m=-3$

Arrange the students into teams as explained in “Hot Seat – Teacher Instructions.” Set up the activity according to the instructions, and allow the students to complete the “Hot Seat - Exercises” on the “Hot Seat – Student Record Sheet.” This engaging cooperative learning activity will provide practice in computing slope given two points.

Student Application – Teacher will present house drawn on a grid and demonstrate how to compute the slope of the roof.

Embedded Assessment – During the “Hot Seat” activity, assess student understanding by which teams are successful and which are not.

Students will receive the “Steppin’ It Up” homework sheet with ten problems in which to compute the slope given two points. Instruct students to study slope definition and the examples.

Reteaching/Extension –

- For those students who are having difficulty with the slope formula computation, suggest the use of the calculator and/or the definition of slope to keep the numbers in their proper order.
- For those students who are grasping the concept well, then more problems with challenging slope values will be given.

Lesson 3

Preassessment – Set a time limit of six minutes. Have the students complete the “Warm-Up”, which contains two problems to

determine the slope of a line given the coordinates of two points. Review the homework for correctness and discuss any misunderstandings.

Launch - Students will play a “Scavenger Hunt” to review for a quiz. Students will question / discuss any process and/or meaning for determining the slope.

Teacher Facilitation - Explain to the students how to play “Scavenger Hunt”. The teacher may help students who are getting frustrated or falling behind the average work completed. Discuss any problems in the Scavenger Hunt that were problematic to many students.

Embedded Assessment - Students will complete “Scavenger Hunt” which reviews the various definitions for slope, determining the slope of a line graphically and algebraically using the coordinate pairs of two points. The answer to the Scavenger Hunt is A L G E B R S M I N K U D O X V T

Reteaching/Extension

- After each student finishes the quiz, a “Slope Application” sheet would be given for students to determine a real world problem that involves slope.

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## Vocabulary Cards

Positive	Negative
Rise	Run
Vertical	Horizontal
Zero	Steepness
$x$	$y$
Undefined	Rate of Change

## Vocabulary Report

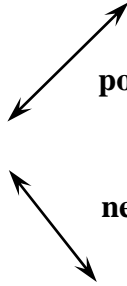
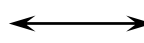

Name \_\_\_\_\_

Term	Definition	Example



# Vocabulary Report

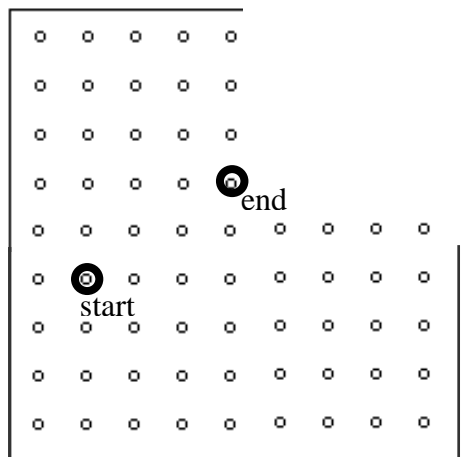
Name ANSWER KEY

Term	Definition	Example
slope	<ul style="list-style-type: none"> <li>– a number that describes the steepness of a line</li> <li>– "rise over run"</li> <li>– rate of change</li> <li>– "m" is the slope variable</li> <li>– vertical change divided by horizontal change</li> <li>– formula: <math>m = \frac{y_2 - y_1}{x_2 - x_1}</math></li> </ul>	 <p>positive slope</p> <p>negative slope</p>
		 <p>zero slope</p>
		 <p>undefined slope</p>

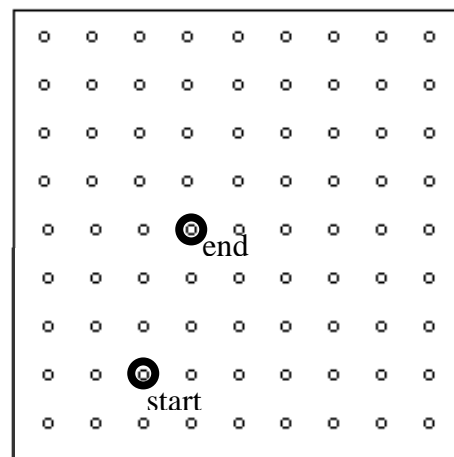
For each of the following problems:

- 1) Draw the rise and run between given points.
- 2) Write the slope of the line.
- 3) Draw a line through the two points to each edge.
- 4) Circle another point on the line and draw rise/run.

A.

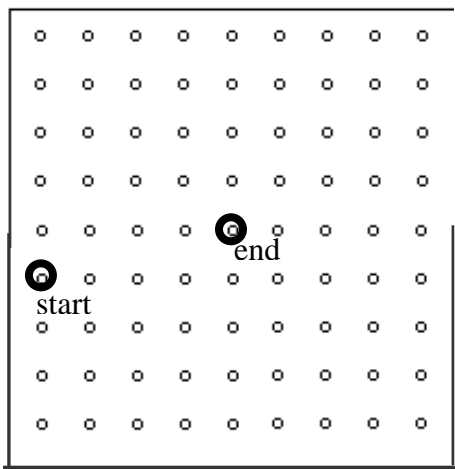


B.

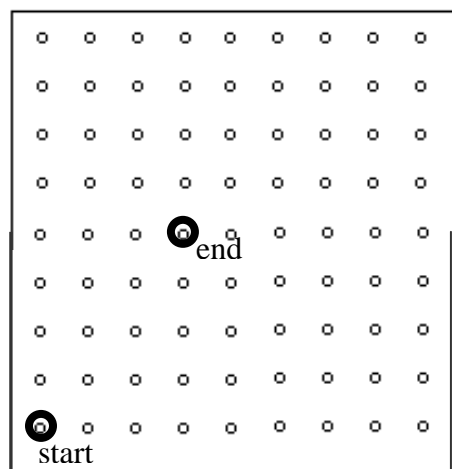


Rise: \_\_\_\_\_ Run: \_\_\_\_\_ Rise: \_\_\_\_\_ Run: \_\_\_\_\_  
 Slope: \_\_\_\_\_ Slope: \_\_\_\_\_

C.



D.



Rise: \_\_\_\_\_ Run: \_\_\_\_\_ Rise: \_\_\_\_\_ Run: \_\_\_\_\_  
 Slope: \_\_\_\_\_ Slope: \_\_\_\_\_

5.) Order the lines above by steepness from least to greatest. \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

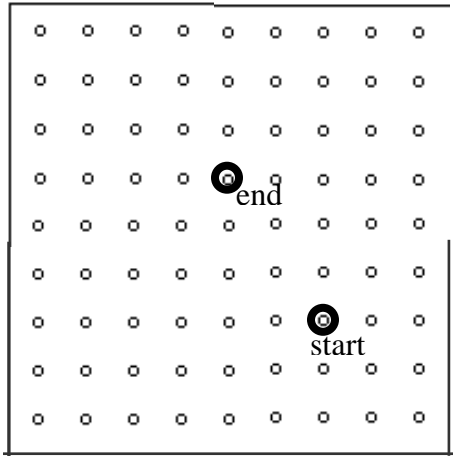
6.) Write the slope of the lines in the order above. \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

7.) What do you notice about the list of slope values?

For each of the following problems:

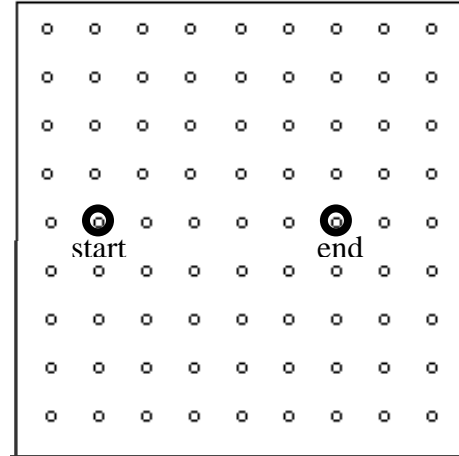
- 1) Draw the rise and run between given points.
- 2) Write the slope of the line.
- 3) Draw a line through the two points to each edge.
- 4) Circle another point on the line and draw rise/run.

E.



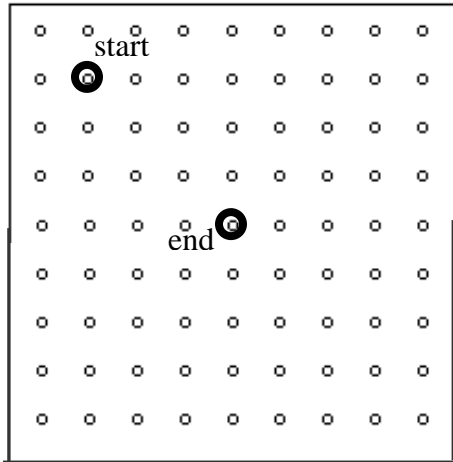
Rise: \_\_\_\_\_ Run: \_\_\_\_\_  
Slope: \_\_\_\_\_

F.



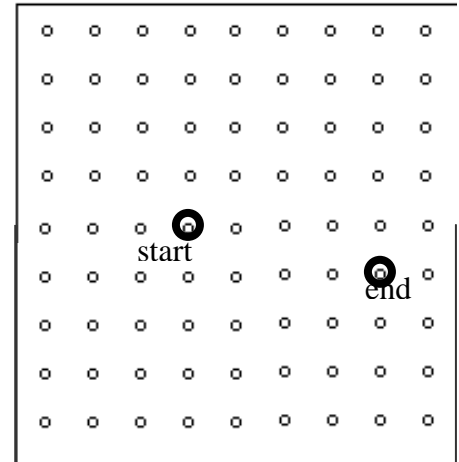
Rise: \_\_\_\_\_ Run: \_\_\_\_\_  
Slope: \_\_\_\_\_

G.



Rise: \_\_\_\_\_ Run: \_\_\_\_\_  
Slope: \_\_\_\_\_

H.

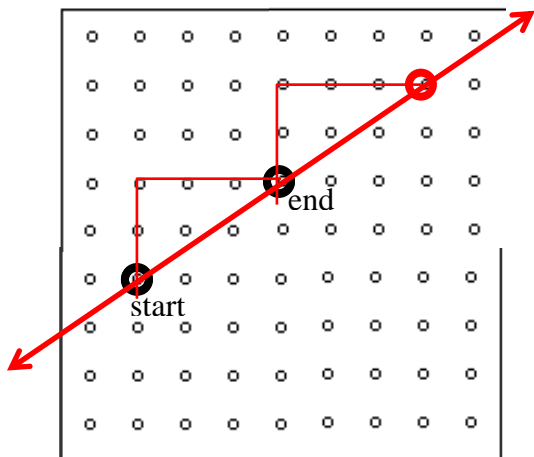


Rise: \_\_\_\_\_ Run: \_\_\_\_\_  
Slope: \_\_\_\_\_

For each of the following problems:

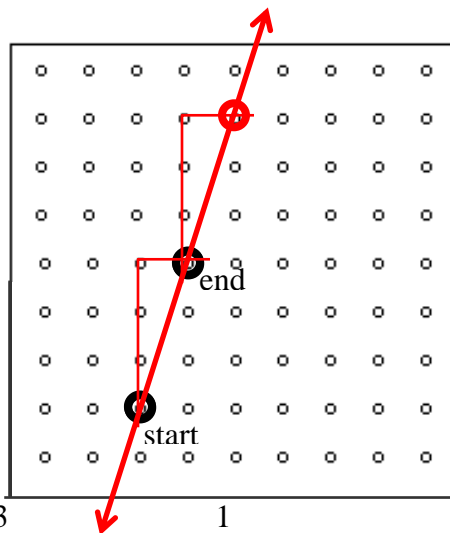
- 1) Draw the rise and run between given points.
- 2) Write the slope of the line.
- 3) Draw a line through the two points to each edge.
- 4) Circle another point on the line and draw rise/run.

A.



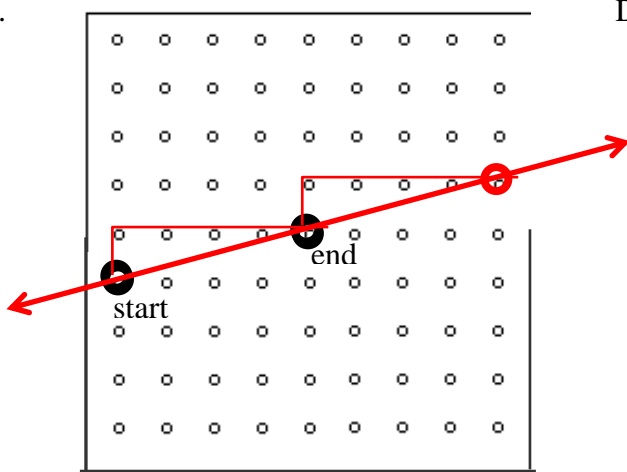
Rise: 2 Run: 3  
Slope:  $\frac{2}{3}$

B.



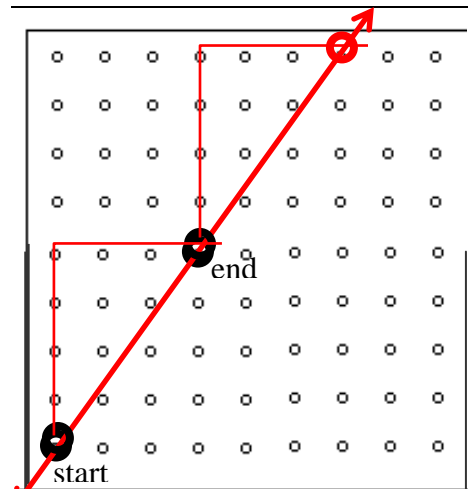
Rise: 3 Run: 1  
Slope:  $\frac{3}{1} = 3$

C.



Rise: 1 Run: 4  
Slope:  $\frac{1}{4}$

D.



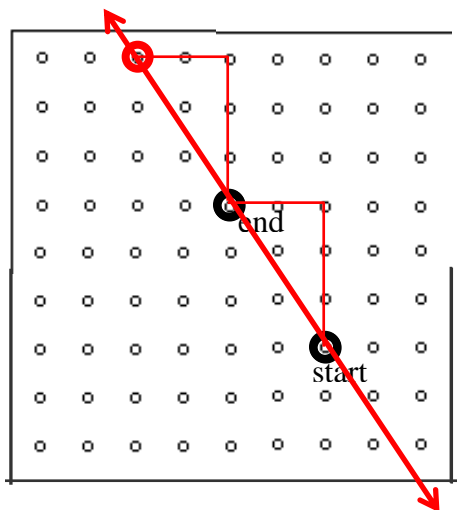
Rise: 4 Run: 3  
Slope:  $\frac{4}{3}$

- 5.) Order the lines above by steepness from least to greatest. C, A, D, B
- 6.) Write the slope of the lines in the order above.  $-\frac{1}{4}$ ,  $-\frac{2}{3}$ ,  $-\frac{4}{3}$ , 3
- 7.) What do you notice about the list of slope values? The line with the greatest steepness has the greatest slope. As the steepness of a line increases, the value of its slope increases.

For each of the following problems:

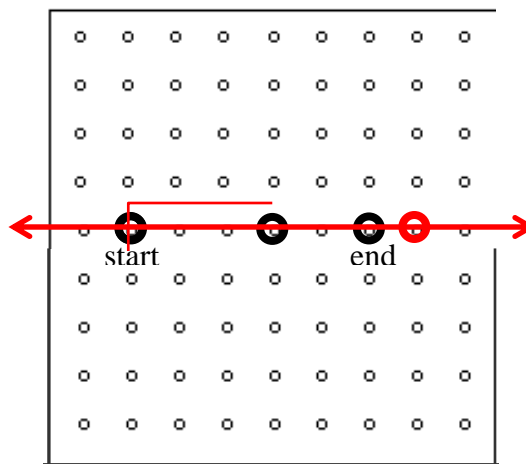
- 1) Draw the rise and run between given points.
- 2) Write the slope of the line.
- 3) Draw a line through the two points to each edge.
- 4) Circle another point on the line and draw rise/run.

E.



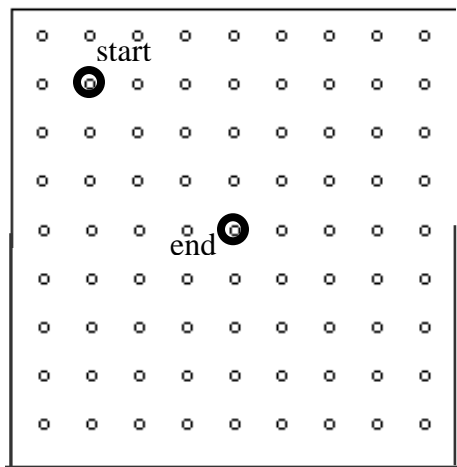
Rise: 3      Run: -2  
Slope:  $-\frac{3}{2}$

F.



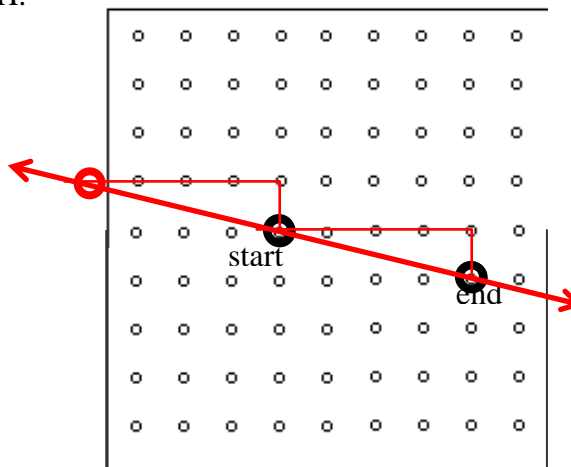
Rise: 0      Run: 3  
Slope: 0

G.



Rise: -3      Run: 3  
Slope: -1

H.

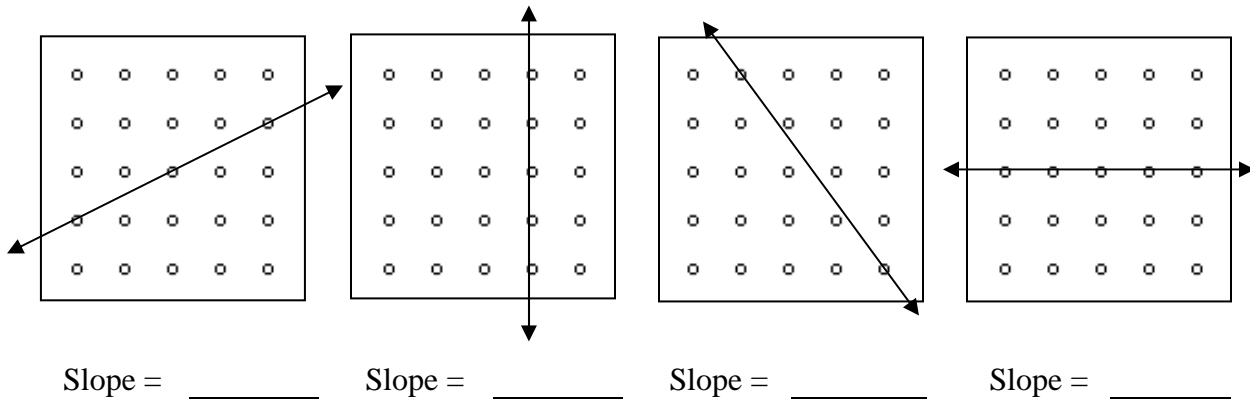


Rise: 1      Run: -4  
Slope:  $-\frac{1}{4}$

**GeoBoards**  
**Exit Ticket**

Name: \_\_\_\_\_

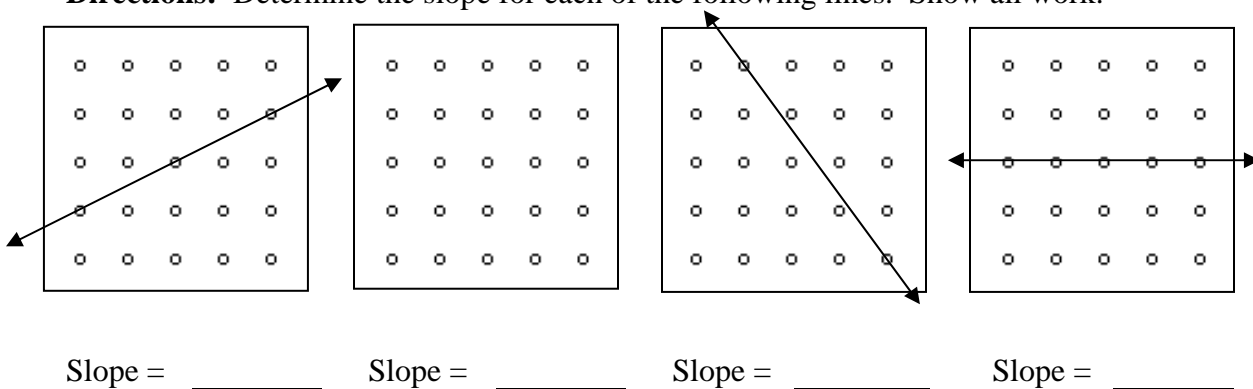
**Directions:** Determine the slope for each of the following lines. Show all work.



**GeoBoards**  
**Exit Ticket**

Name: \_\_\_\_\_

**Directions:** Determine the slope for each of the following lines. Show all work.

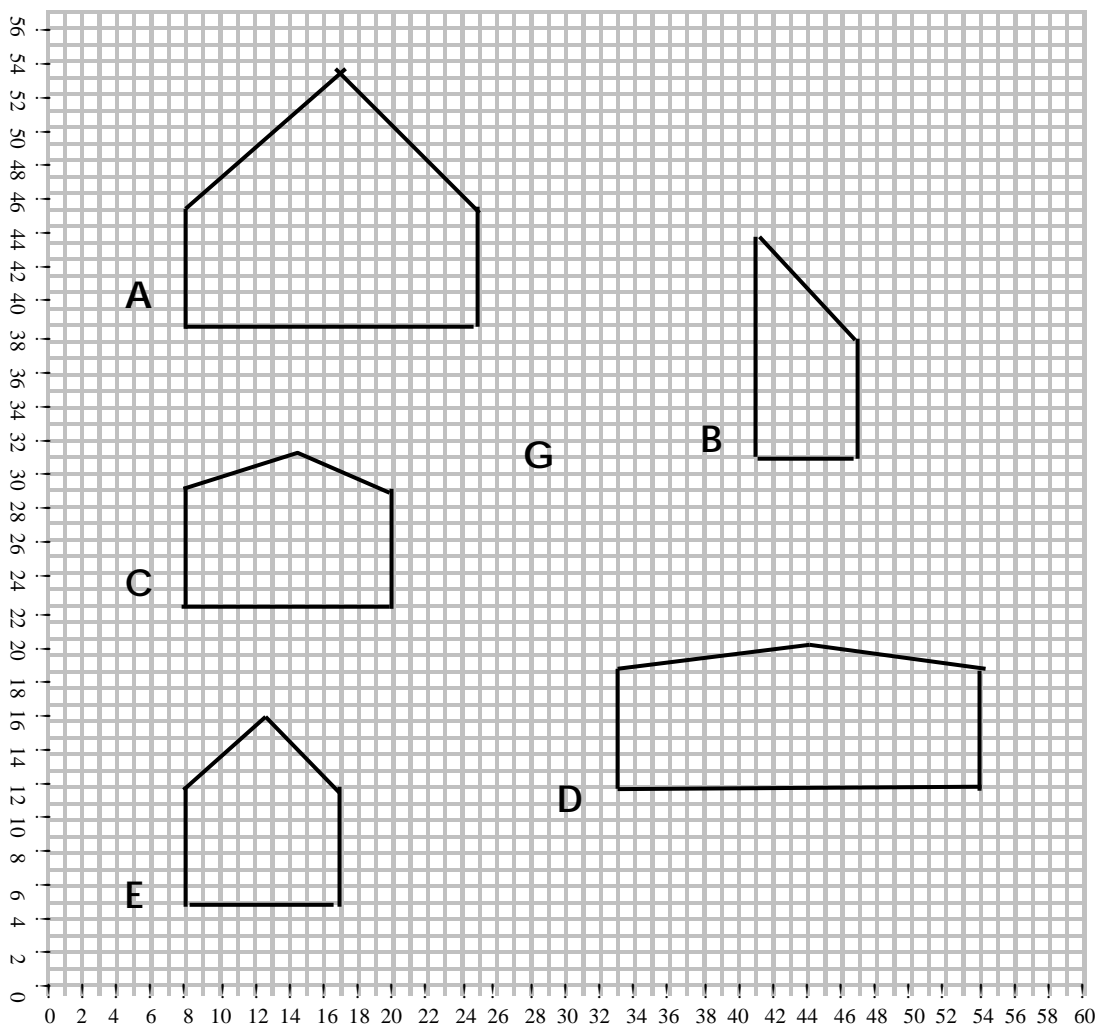


Name \_\_\_\_\_

Date \_\_\_\_\_

### Extension: Slope Applications

Given the various buildings drawn below, determine the slope of each roof by using the slope formula or by graphing.



A

B

C

D

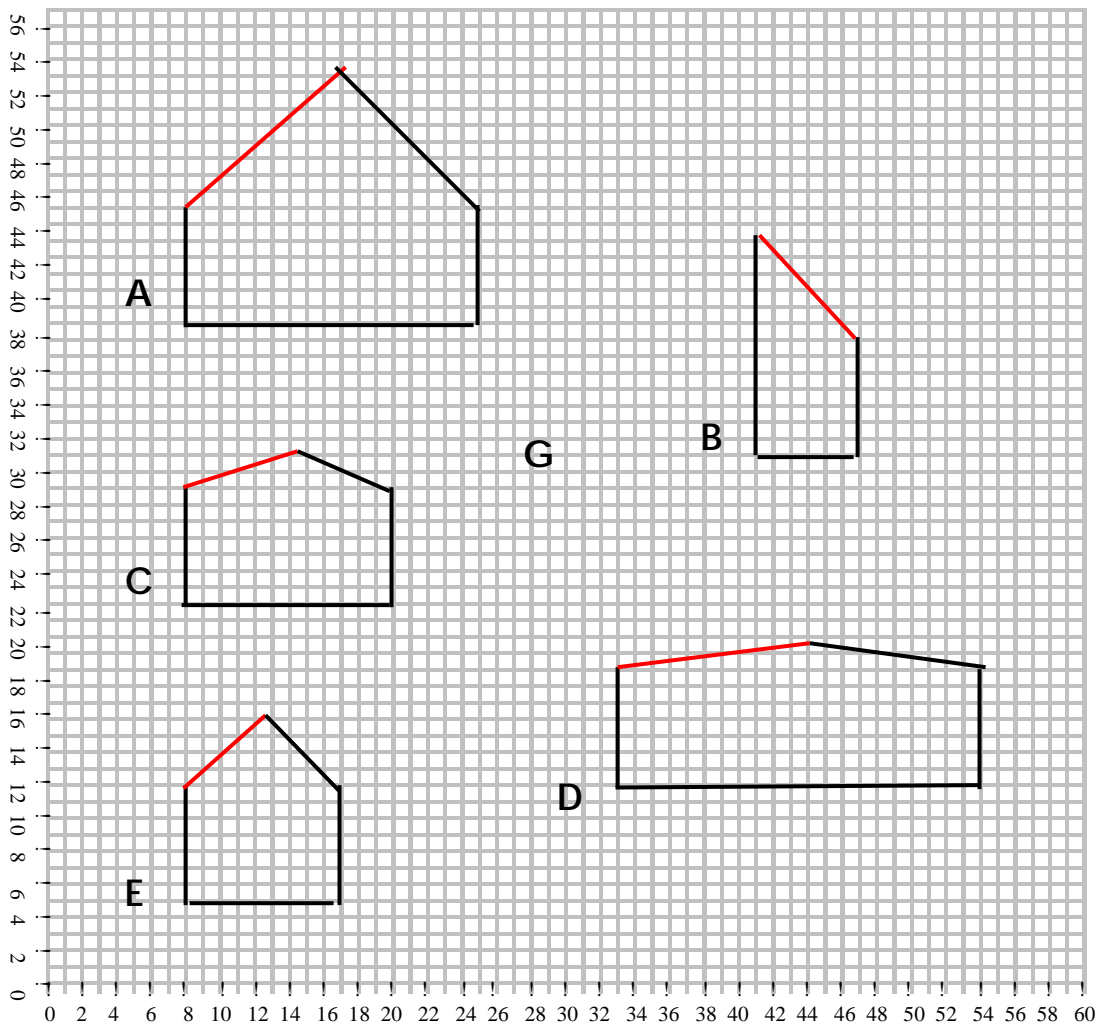
E

Name \_\_\_\_\_

Date \_\_\_\_\_

### Extension: Slope Applications

Given the various buildings drawn below, determine the slope of each roof by using the slope formula or by graphing.



A  $8/9$

B  $-5/6$

C  $2/7$

D  $2/11$

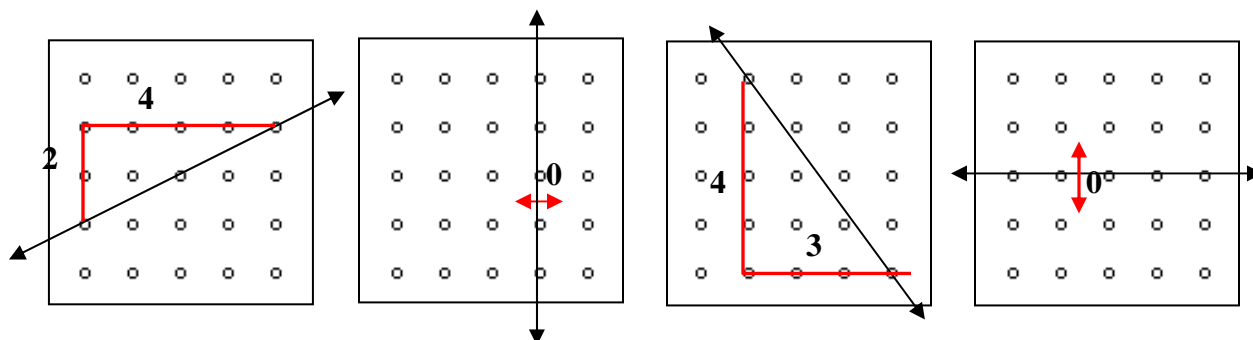
E  $6/5$



**GeoBoards**  
**Exit Ticket**

Name: \_ANSWER KEY\_

**Directions:** Determine the slope for each of the following lines. Show all work.



Slope =  $\frac{2}{4} = \frac{1}{2}$

Slope = Undefined

Slope =  $-\frac{4}{3}$

Slope = 0

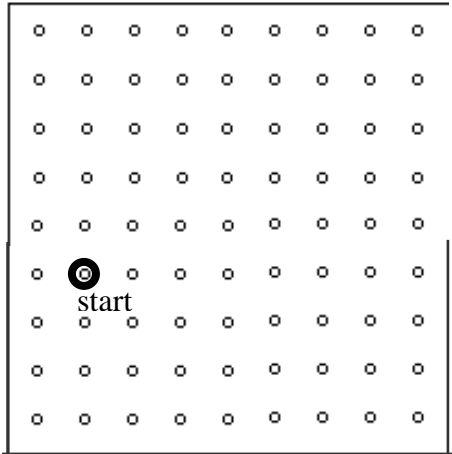
# GeoBoards Homework

Name: \_\_\_\_\_

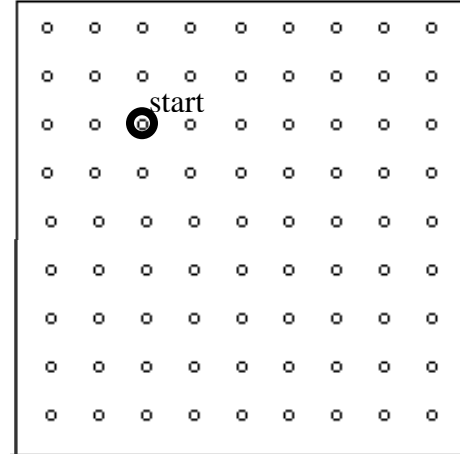
For each of the following problems:

- 1) Using the start point and slope given, find the next point and circled it.
- 2) Draw a line through the two points.

A.



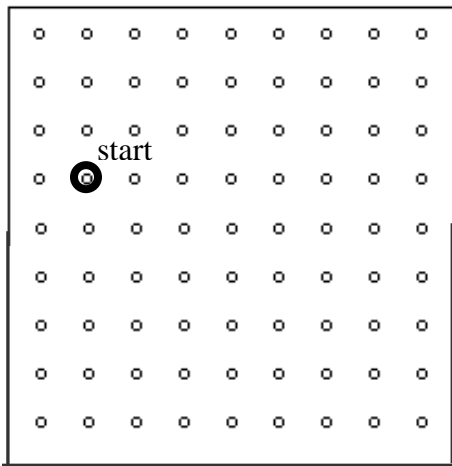
B.



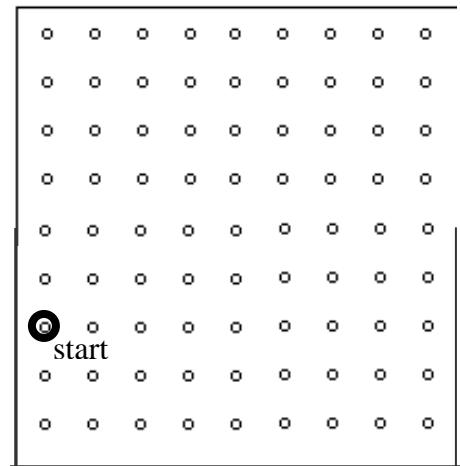
Slope:  $\frac{5}{6}$

Slope:  $-3$

C.



D.



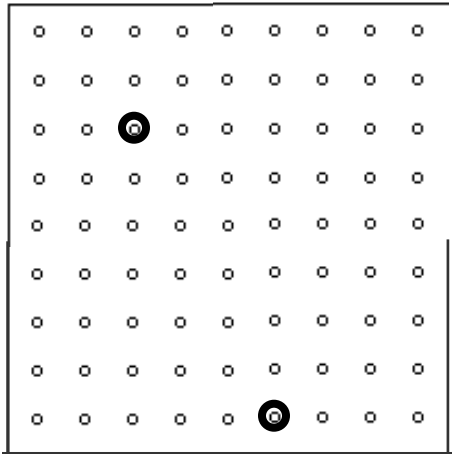
Slope:  $-\frac{1}{7}$

Slope:  $0$

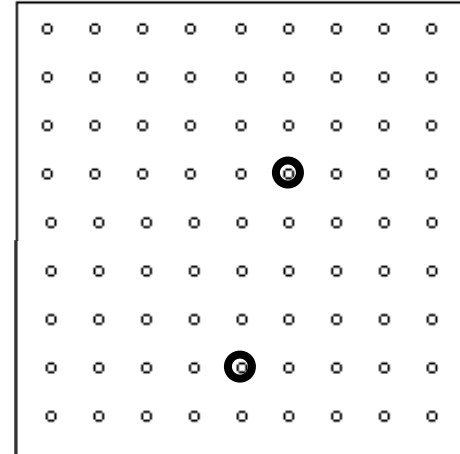
For each of the following problems:

- 1) Using the two points given on the line, draw the rise and run.
- 2) Label the rise and run values.
- 3) Determine the slope of the line.

E.



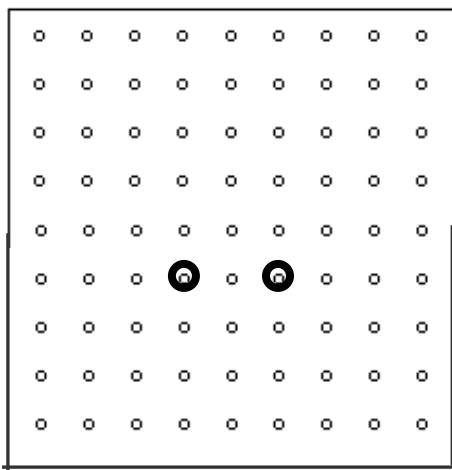
F.



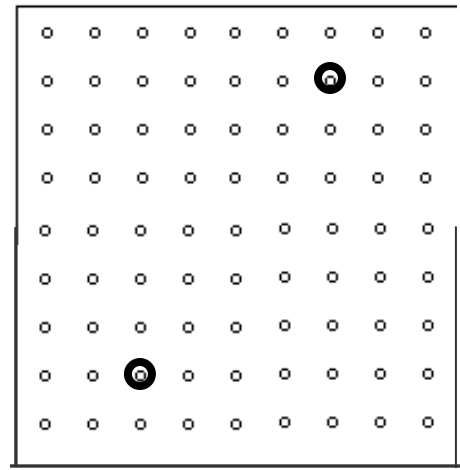
Slope: \_\_\_\_\_

Slope: \_\_\_\_\_

G.



H.



Slope: \_\_\_\_\_

Slope: \_\_\_\_\_

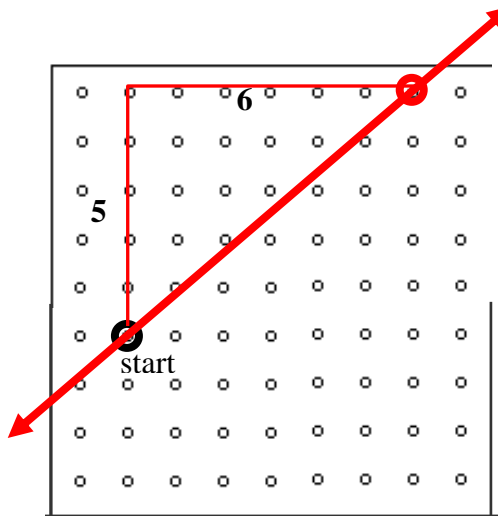
# GeoBoards Homework

Name: \_\_ANSWER KEY\_\_

For each of the following problems:

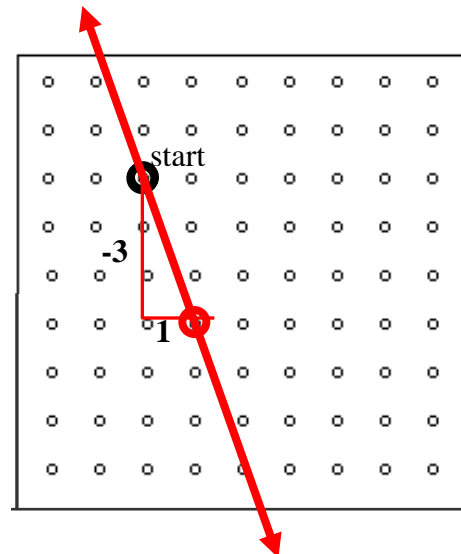
- 1) Using the start point and slope given, find the next point and circled it.
- 2) Draw a line through the two points.

A.



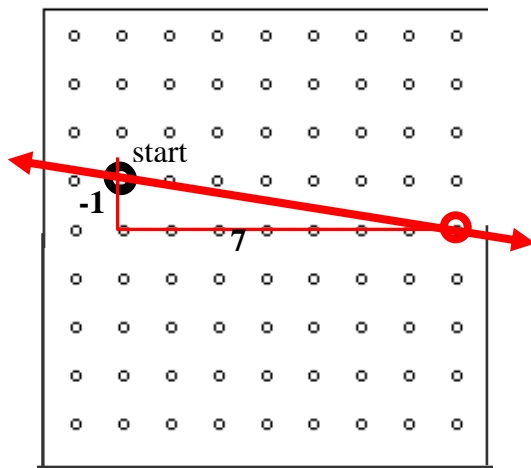
Slope:  $\frac{5}{6}$

B.



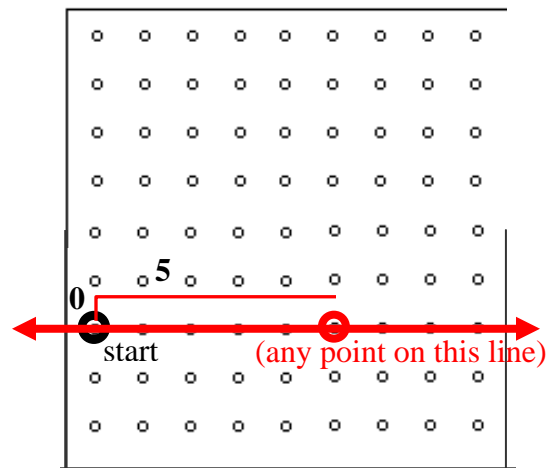
Slope:  $-3$

C.



Slope:  $-\frac{1}{7}$

D.

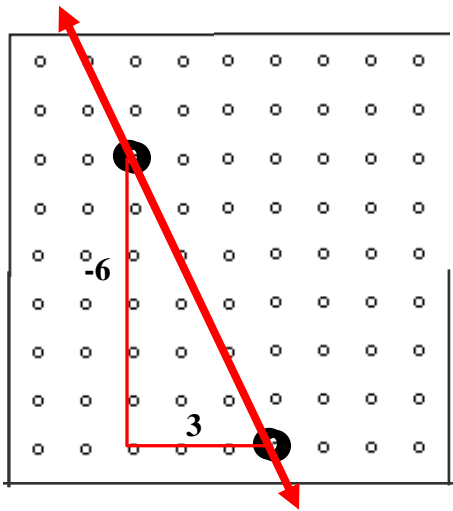


Slope:  $0$

For each of the following problems:

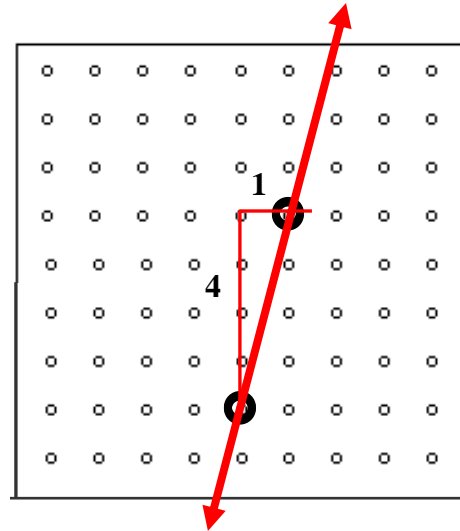
- 1) Using the two points given on the line, draw the rise and run.
- 2) Label the rise and run values.
- 3) Determine the slope of the line.

E.



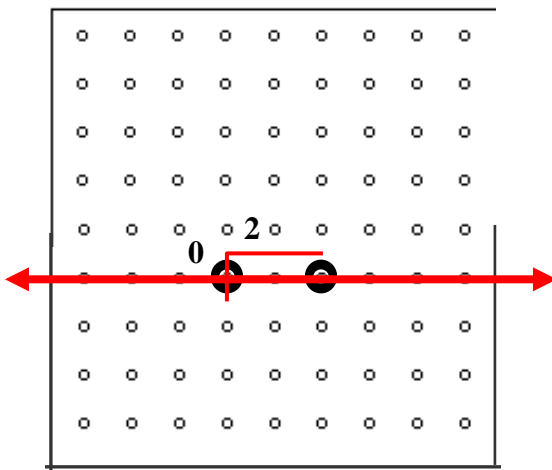
Slope:  $\frac{-6}{3} = -2$

F.



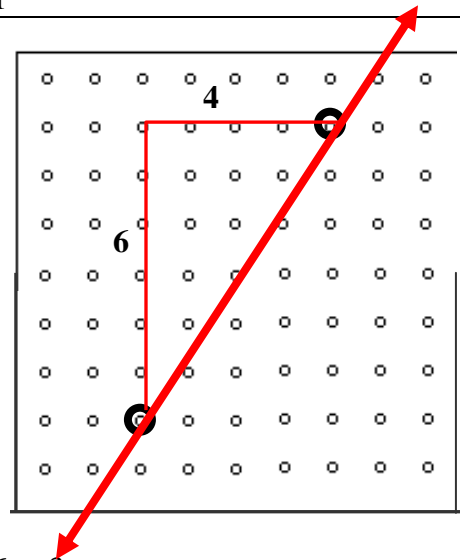
Slope:  $\frac{4}{1} = 4$

G.



Slope: 0

H.



Slope:  $\frac{6}{4} = \frac{3}{2}$

Slopin' It Up  
Warm-Up

Name: \_\_\_\_\_

1. In your own words,  
a) Write the definition for the slope of a line.

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- b) Describe how the slope of a line is calculated.

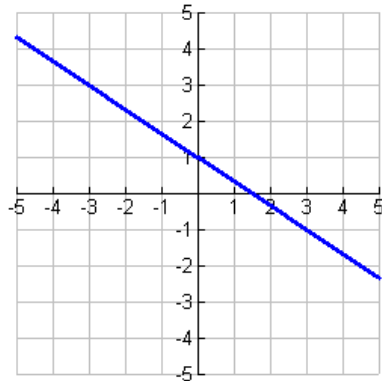
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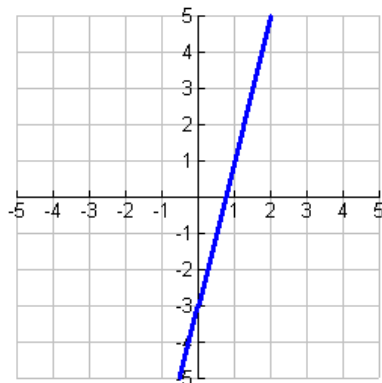
---

2. Determine the slope of each line.

a)



b)



Slopin' It Up  
Warm-Up

Name: \_\_\_\_ANSWER KEY\_\_\_\_\_

1. In your own words,  
a) Write the definition for the slope of a line.

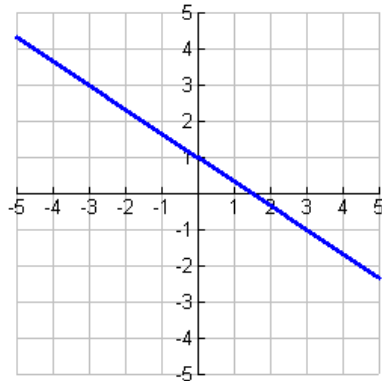
Answers will vary.

- b) Describe how the slope of a line is calculated.

Answers will vary.

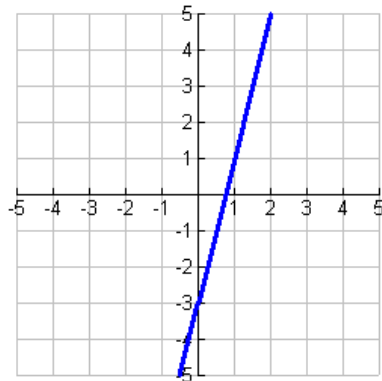
2. Determine the slope of each line.

a)



$$\text{Slope} = -\frac{2}{3}$$

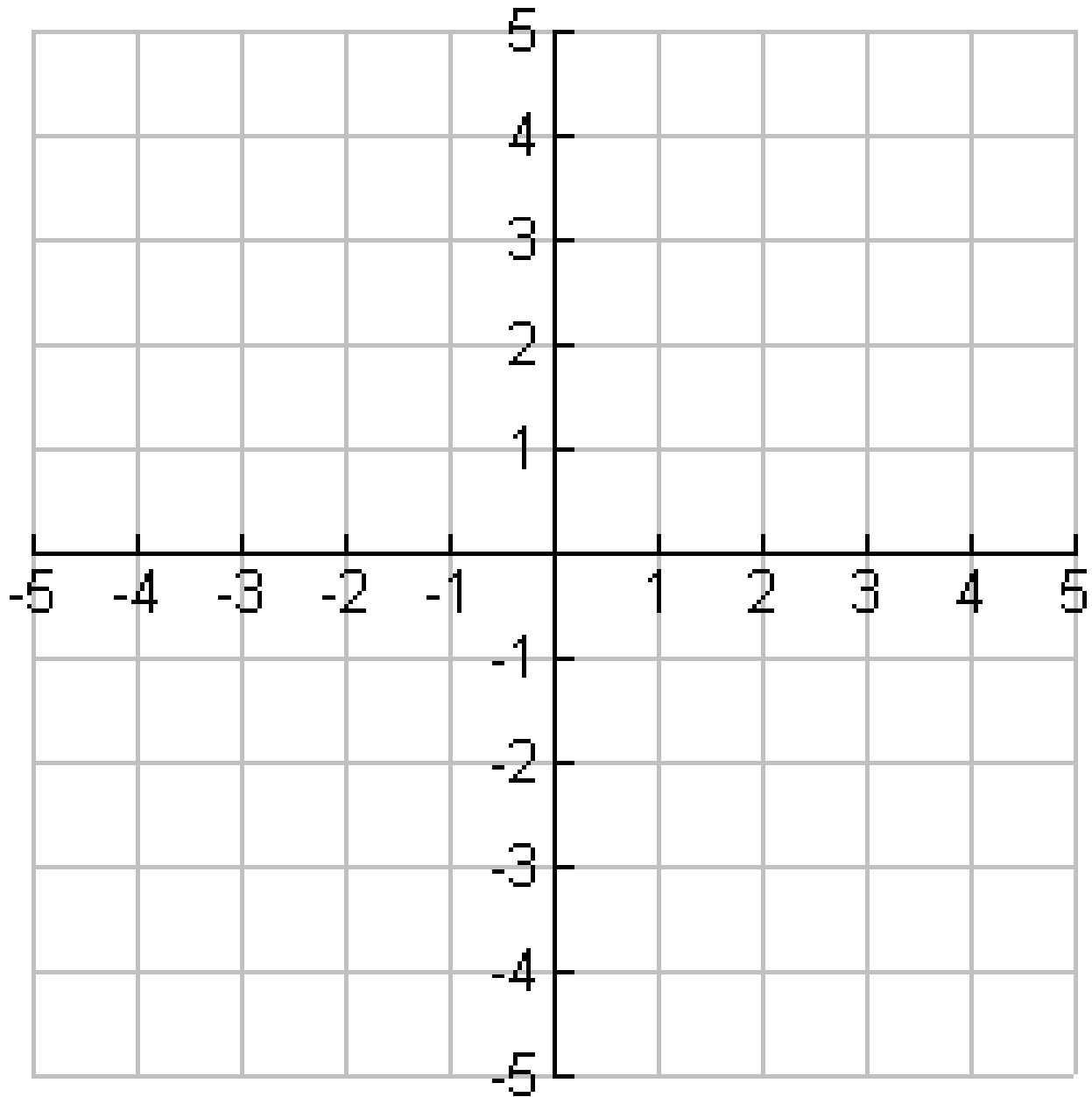
b)



$$\text{Slope} = 4$$

## Coordinate Grid Transparency

**Teacher Directions:** Copy this onto a transparency and place under the teacher GeoBoard on the overhead projector. Use this to show how "rise over run" determination of slope relates to an algebraic approach using coordinate values.





**Four Corners Activity**  
**Slopes**

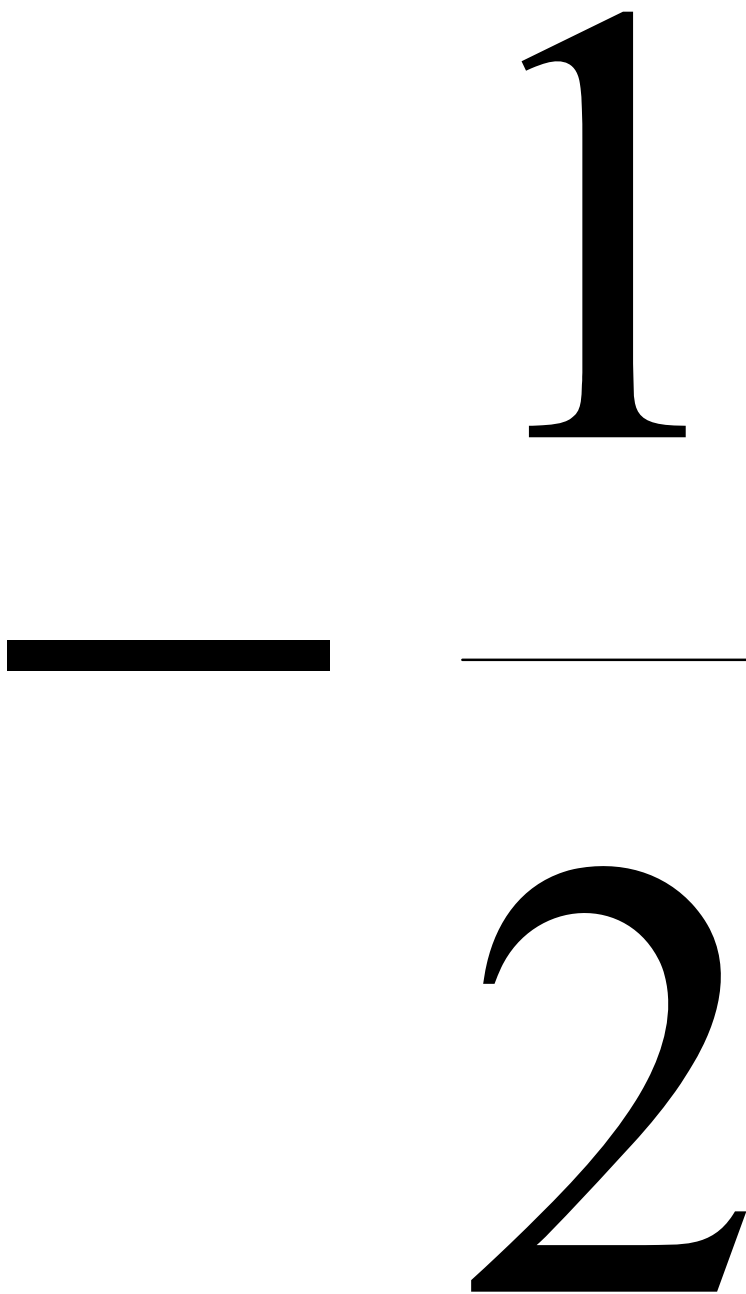


-2

1

---

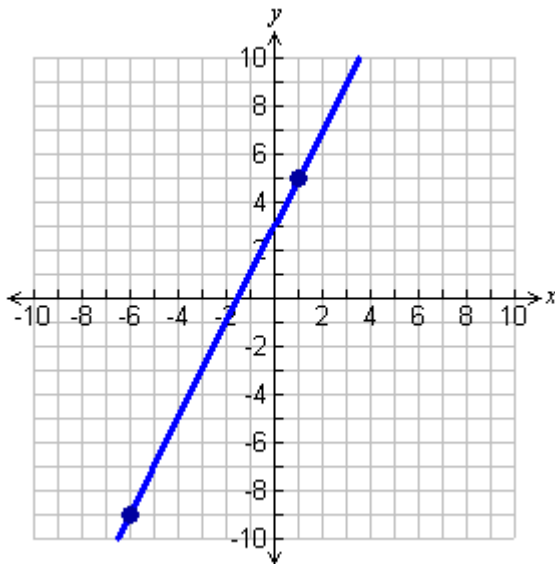
2



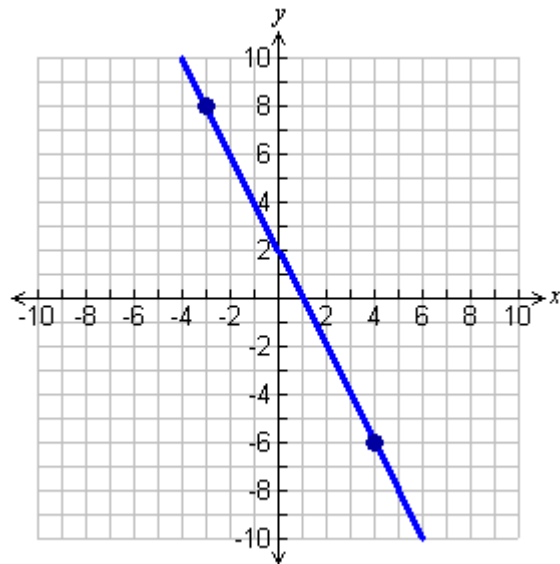
## Four Corners Activity Graphs

**Directions:** Laminate these pages for long-term use. Cut out each of the following graphs so that you have one for each student.

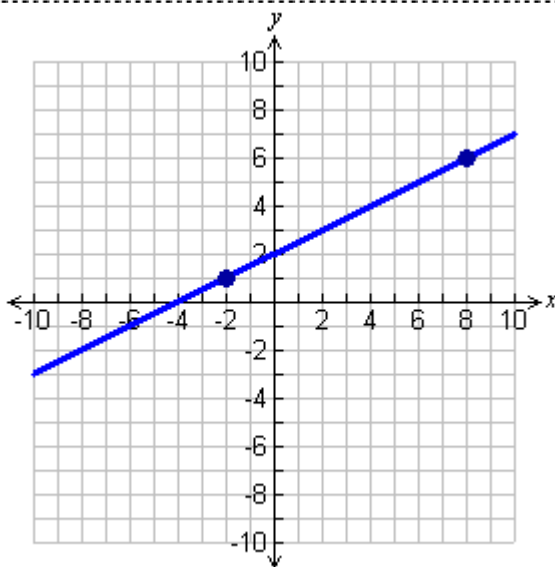
A



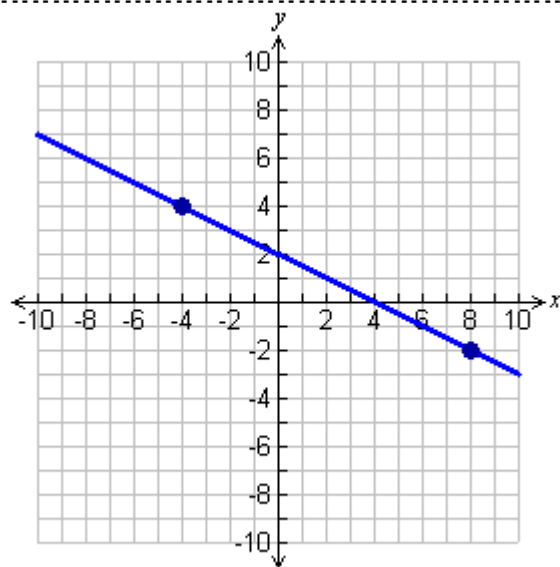
B



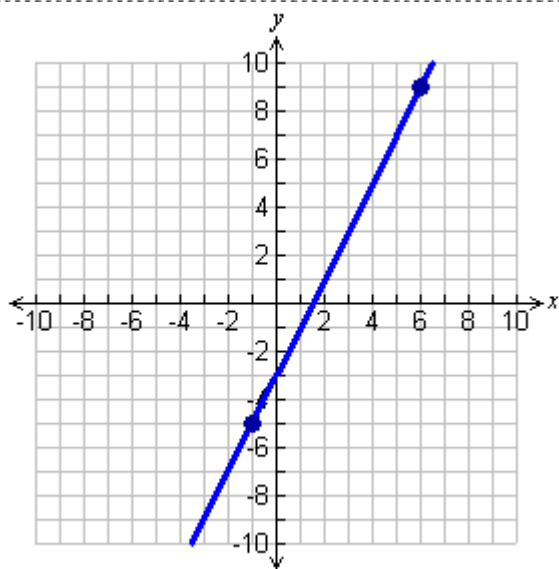
C



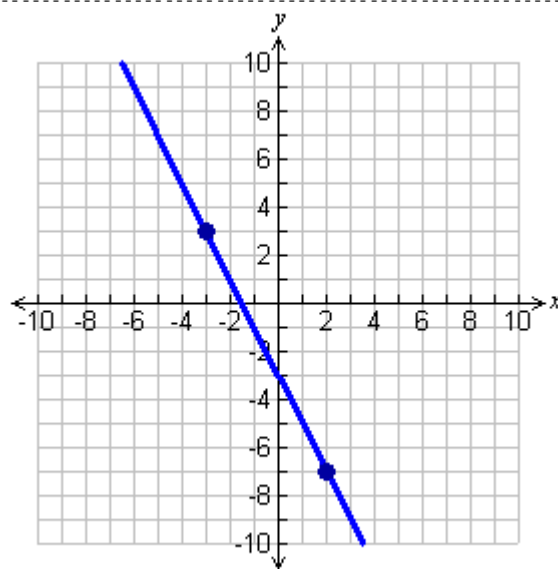
D



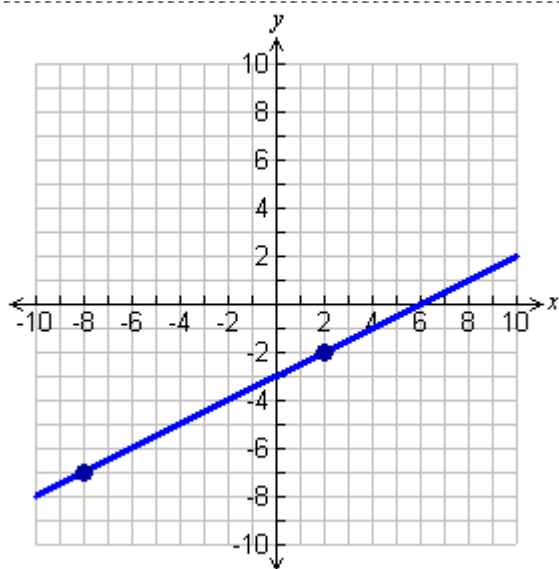
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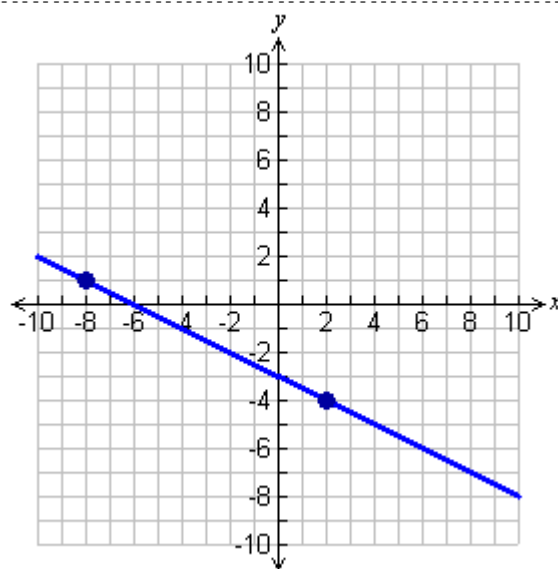
# F

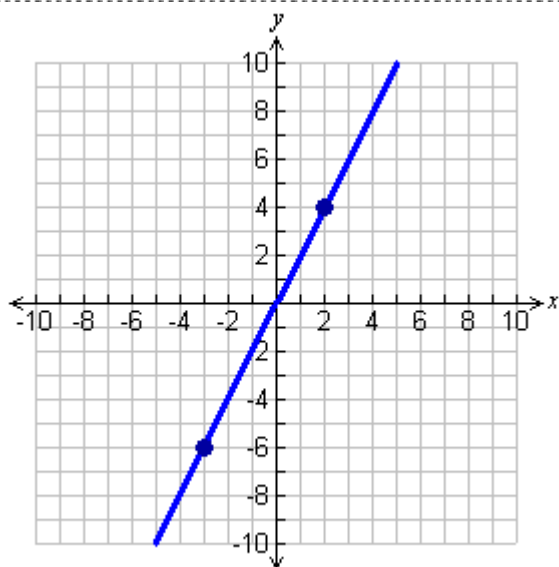
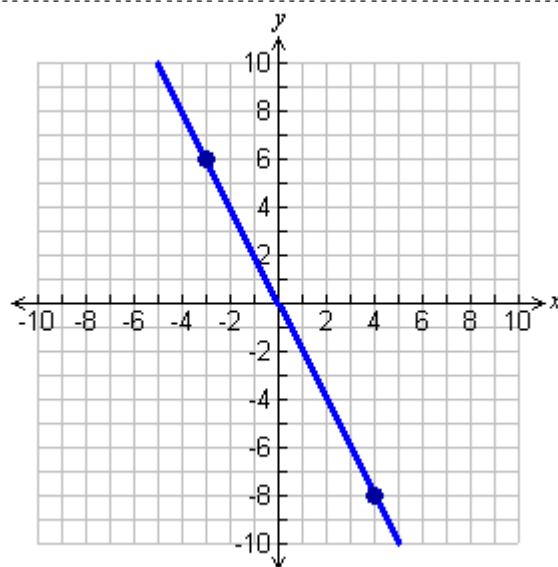
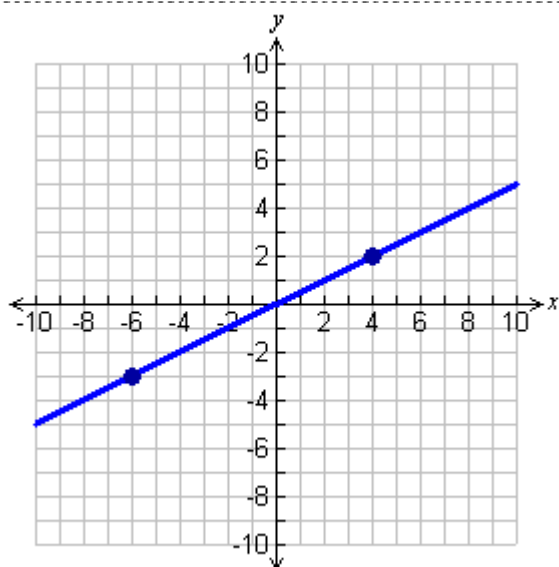
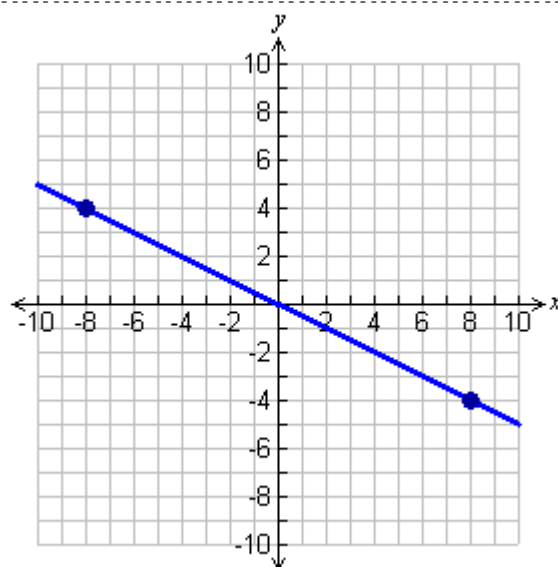


# G

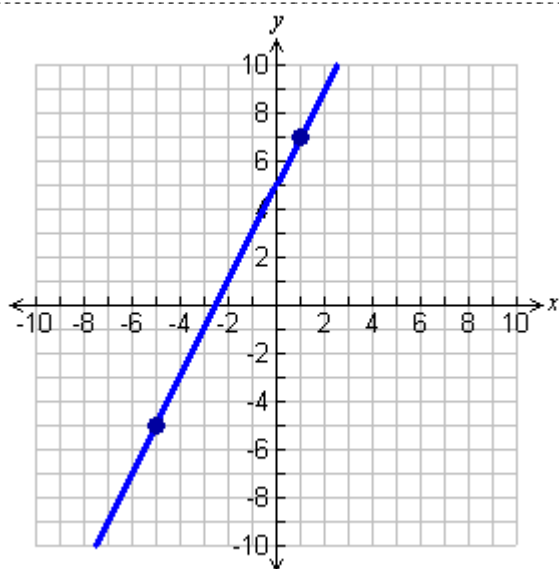


# H

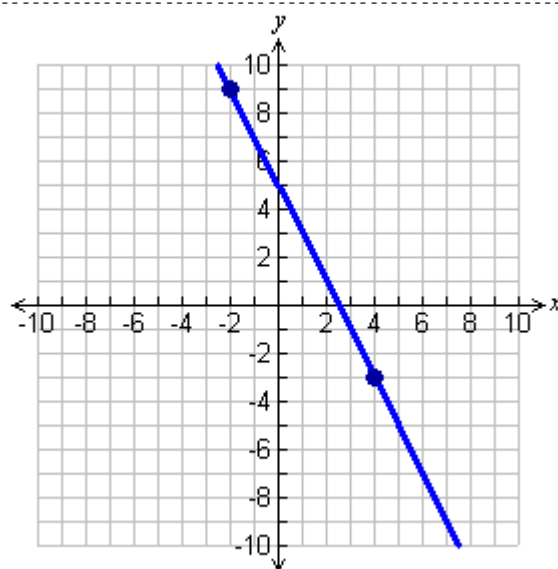


**I****J****K****L**

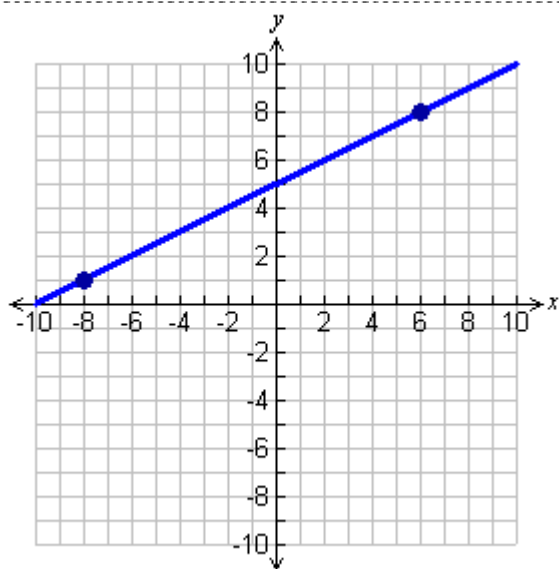
# M



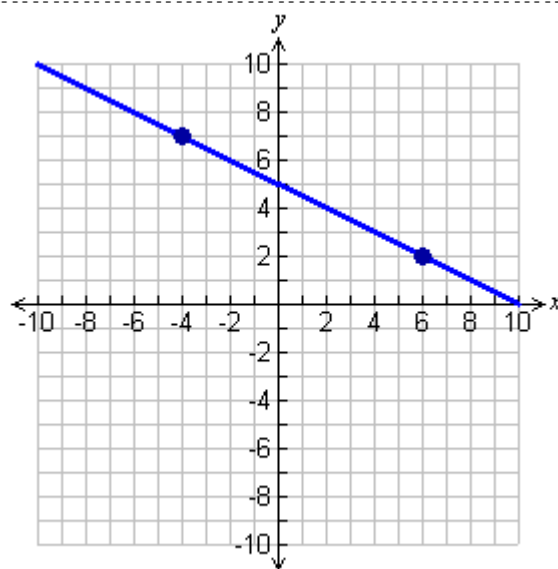
# N



# P

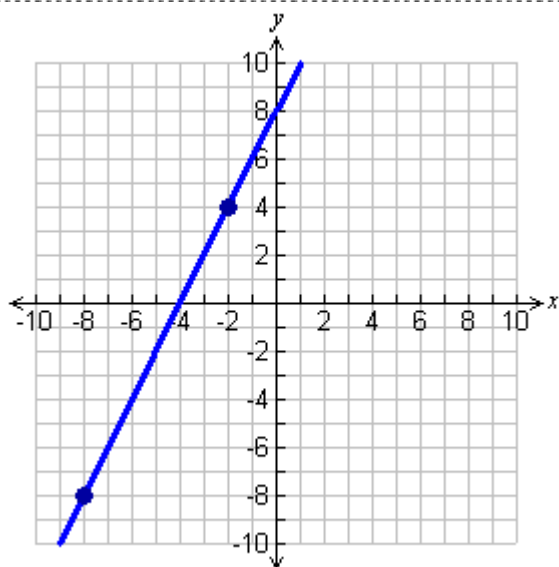


# Q

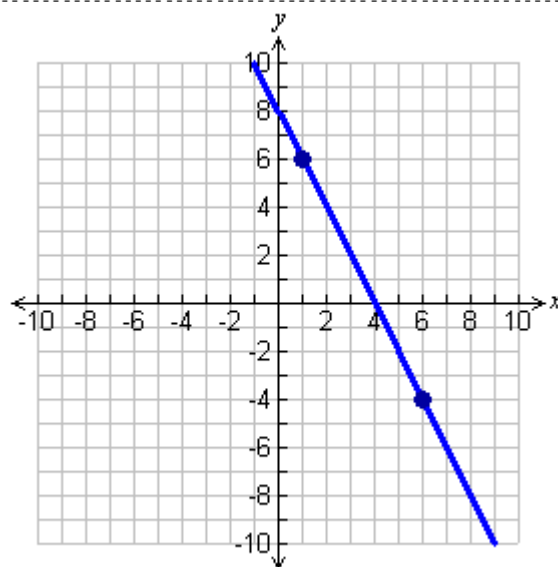




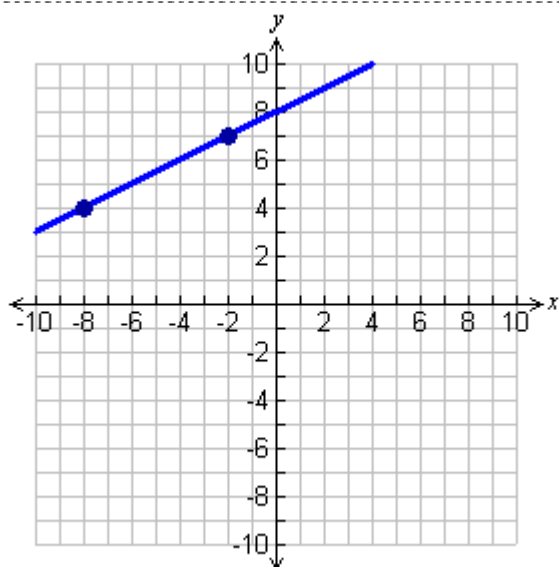
# R



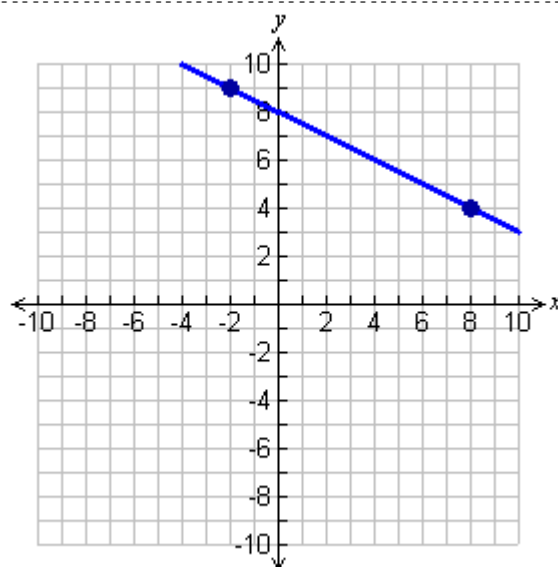
# S



# T



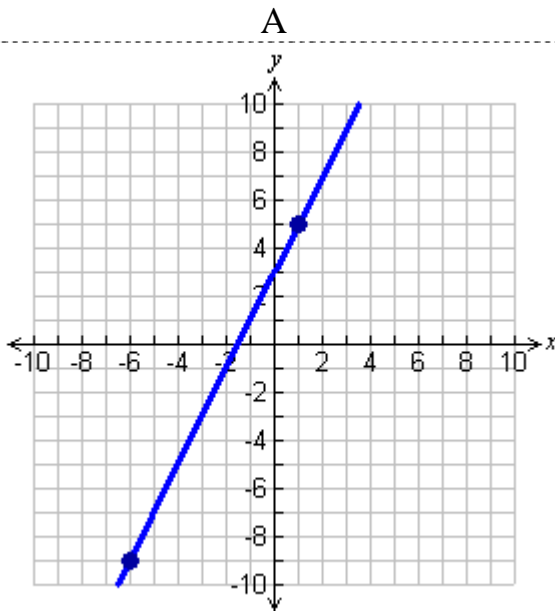
# U



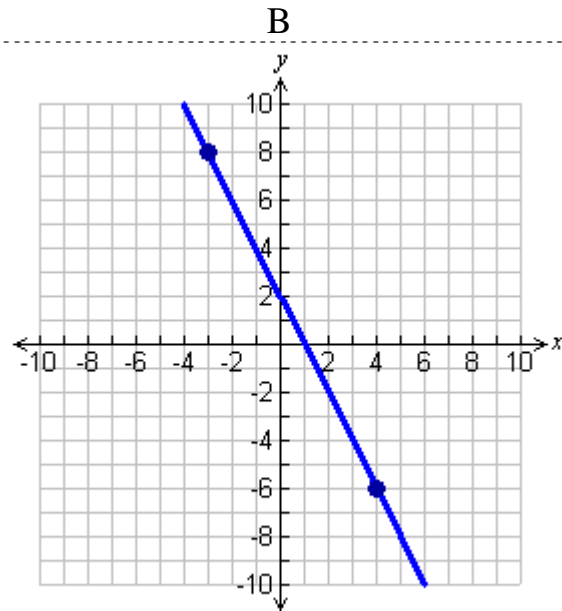
## Four Corners Activity Graphs

## ANSWER KEY

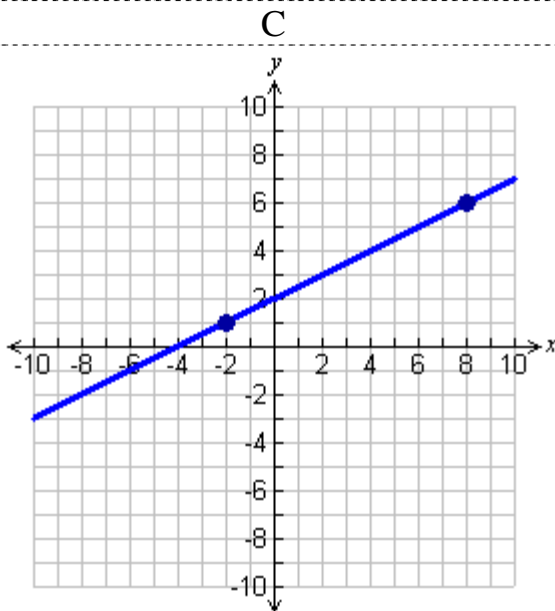
**Directions:** Laminate these pages for long-term use. Cut out each of the following graphs so that you have one for each student.



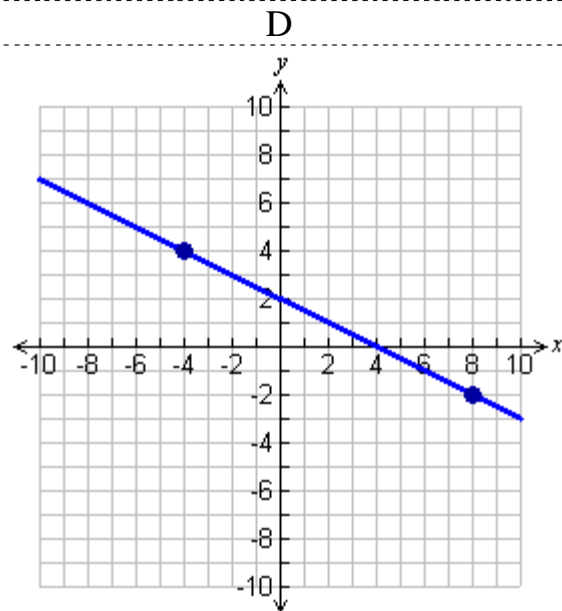
$$\text{Slope} = m = \frac{5 - (-9)}{1 - (-6)} = \frac{14}{7} = 2$$



$$\text{Slope} = m = \frac{8 - (-6)}{-3 - 4} = \frac{14}{-7} = -2$$

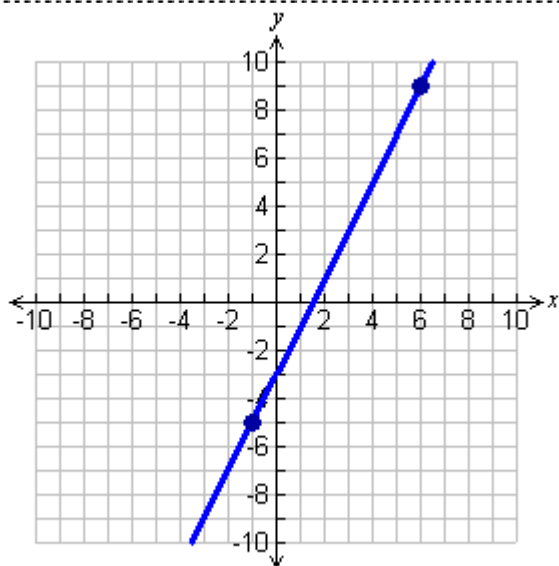


$$\text{Slope} = m = \frac{1 - 6}{-2 - 8} = \frac{-5}{-10} = \frac{1}{2}$$



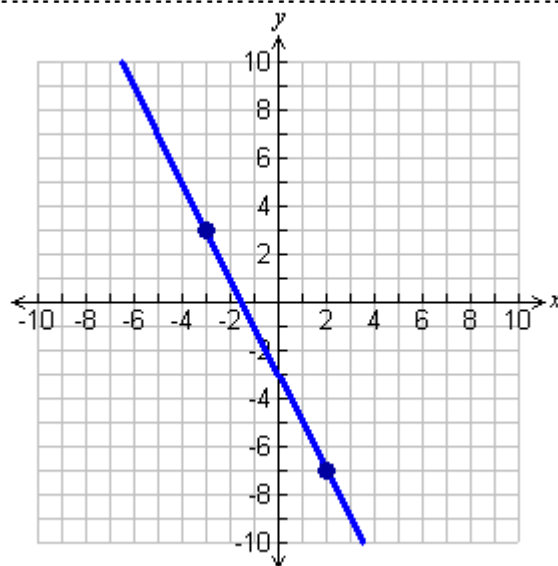
$$\text{Slope} = m = \frac{4 - (-2)}{-4 - 8} = \frac{6}{-12} = -\frac{1}{2}$$

E



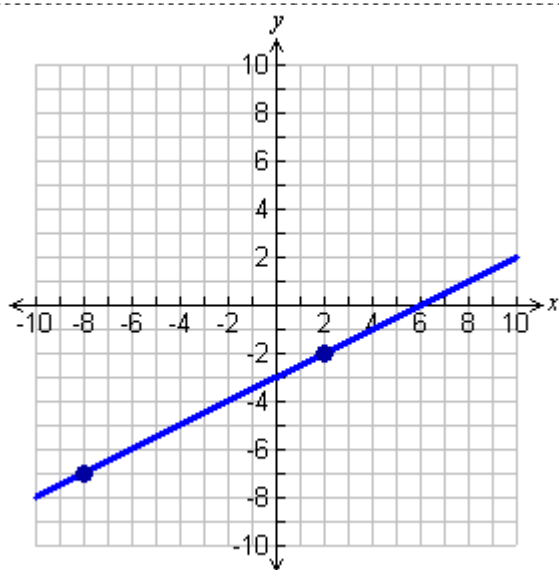
$$\text{Slope} = m = \frac{-5 - 9}{-1 - 6} = \frac{-14}{-7} = 2$$

F



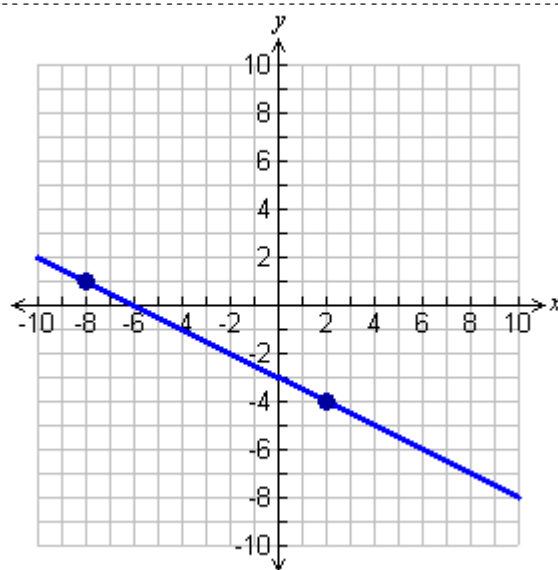
$$\text{Slope} = m = \frac{3 - -7}{-3 - 2} = \frac{10}{-5} = -2$$

G

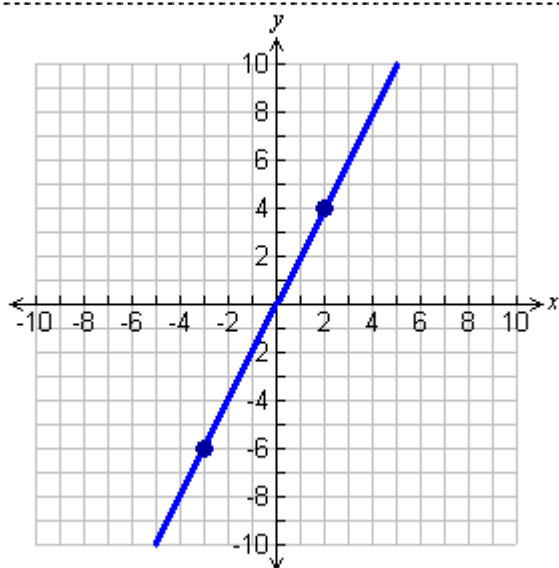


$$\text{Slope} = m = \frac{-7 - -2}{-8 - 2} = \frac{-5}{-10} = \frac{1}{2}$$

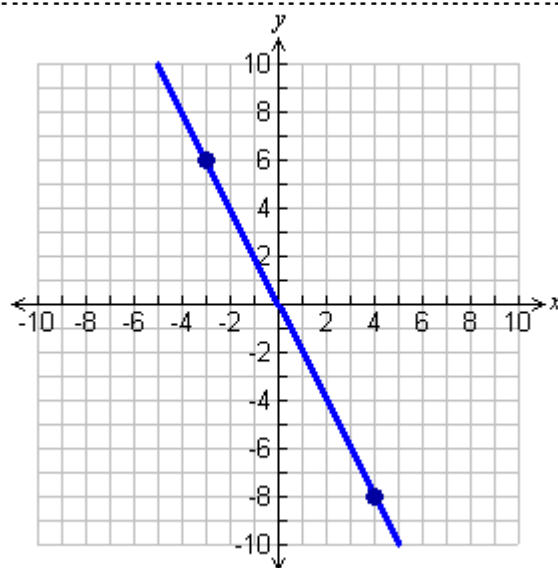
H



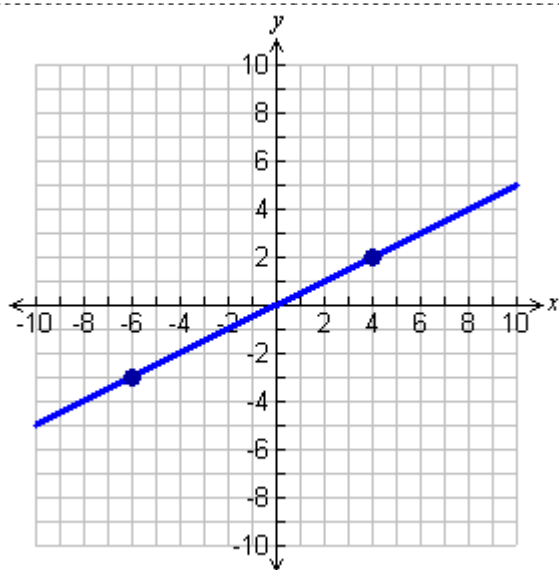
$$\text{Slope} = m = \frac{-4 - -1}{2 - -8} = \frac{-3}{10} = -\frac{3}{10}$$

**I**

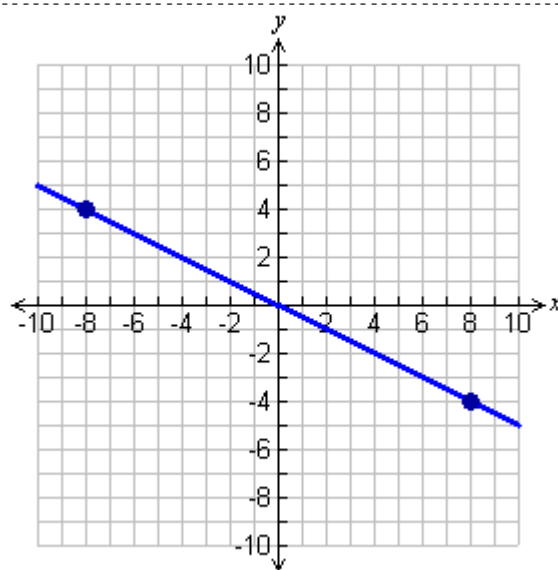
$$\text{Slope} = m = \frac{-6 - 4}{-3 - 2} = \frac{-10}{-5} = 2$$

**J**

$$\text{Slope} = m = \frac{6 - -8}{-3 - 4} = \frac{14}{-7} = -2$$

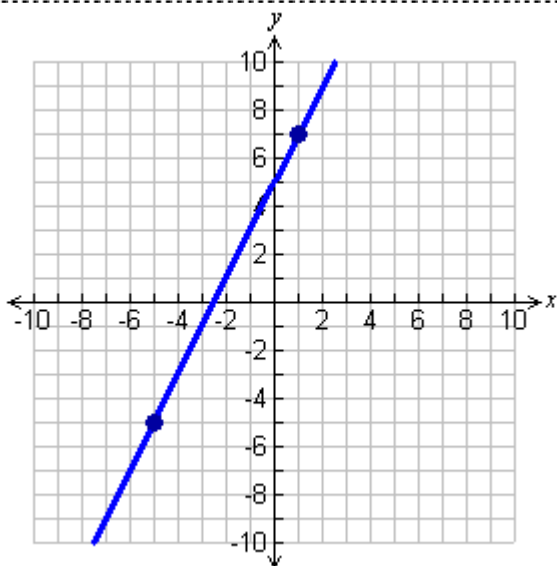
**K**

$$\text{Slope} = m = \frac{-3 - 2}{-6 - 4} = \frac{-5}{-10} = \frac{1}{2}$$

**L**

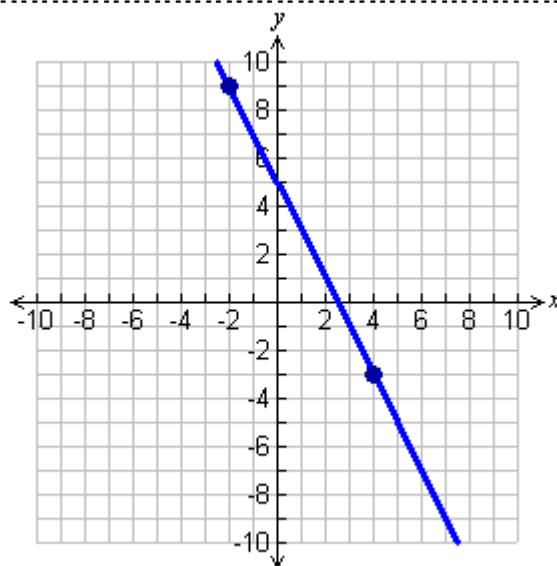
$$\text{Slope} = m = \frac{4 - -4}{-8 - 8} = \frac{8}{-16} = -\frac{1}{2}$$

M



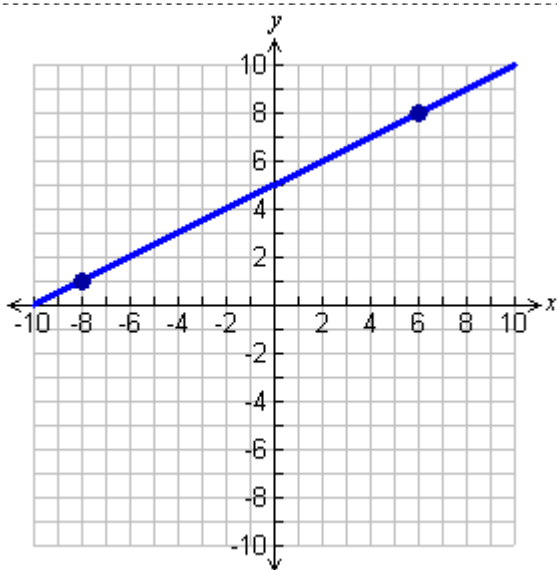
$$\text{Slope} = m = \frac{-5 - 7}{-5 - 1} = \frac{-12}{-6} = 2$$

N



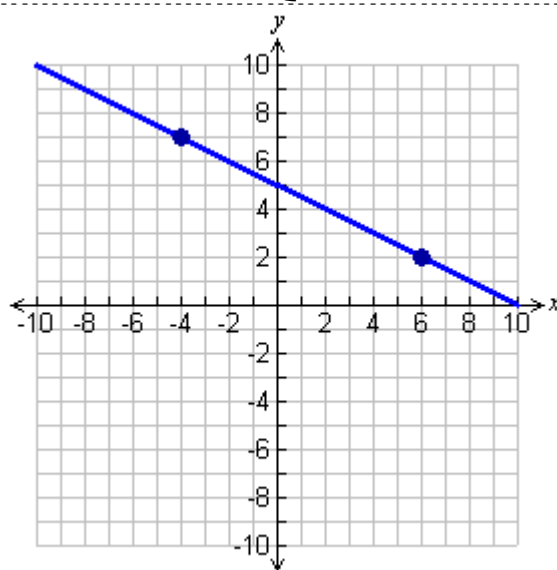
$$\text{Slope} = m = \frac{-3 - 9}{4 - (-2)} = \frac{-12}{6} = -2$$

P



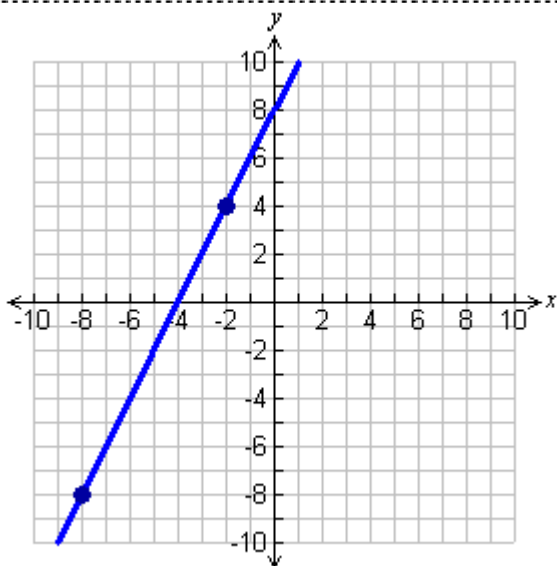
$$\text{Slope} = m = \frac{1 - 8}{-8 - 6} = \frac{-7}{-14} = \frac{1}{2}$$

Q



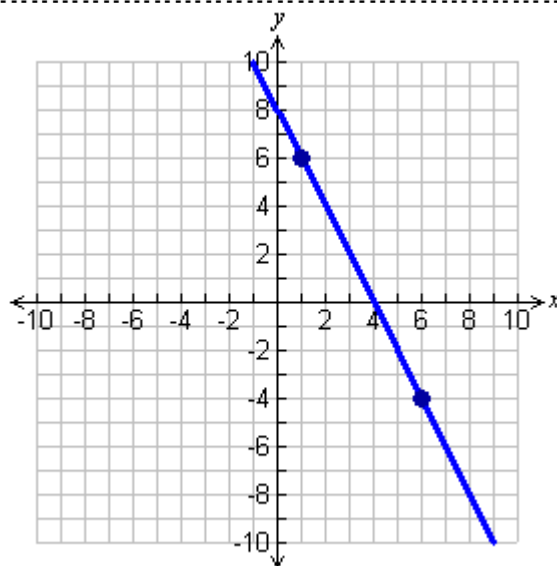
$$\text{Slope} = m = \frac{7 - 2}{-4 - 6} = \frac{5}{-10} = -\frac{1}{2}$$

R



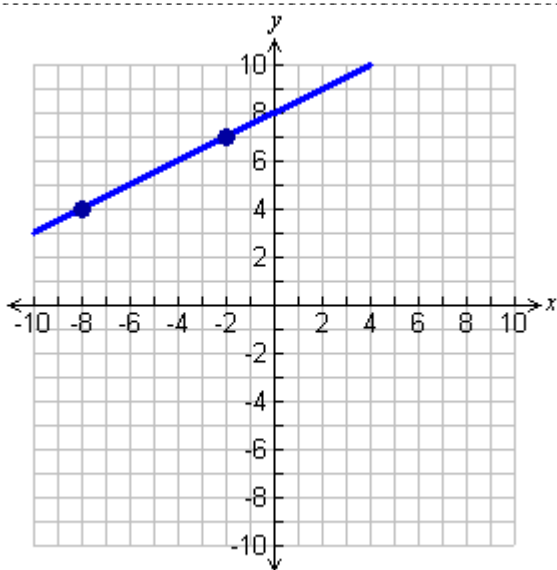
$$\text{Slope} = m = \frac{-8 - 4}{-8 - -2} = \frac{-12}{-6} = 2$$

S



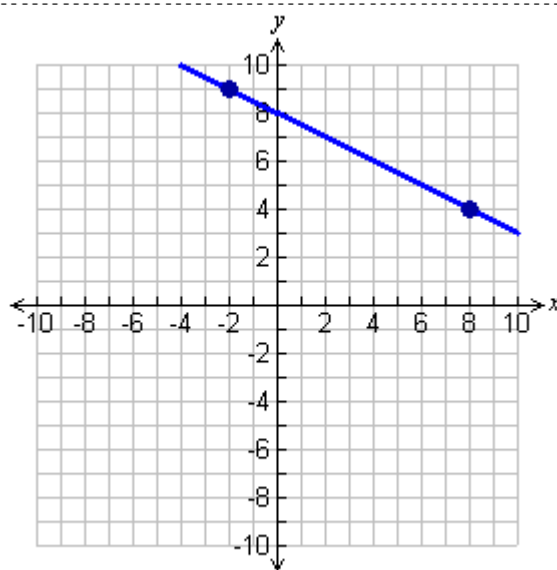
$$\text{Slope} = m = \frac{6 - -4}{1 - 6} = \frac{10}{-5} = -2$$

T



$$\text{Slope} = m = \frac{7 - 4}{-2 - -8} = \frac{3}{6} = \frac{1}{2}$$

U



$$\text{Slope} = m = \frac{9 - 4}{-2 - 8} = \frac{5}{-10} = -\frac{1}{2}$$

## **HOT SEAT**

### **Teacher Instructions**

#### **Set Up:**

- ✓ Copy the problem sheet so that there is one for each team.
- ✓ Cut the problem sheet into slips with one problem per slip.
- ✓ Copy the Hot Seat Activity handout, one for each student.
- ✓ Break the class into teams. Each team sits in a row, one behind the other, facing the overhead screen.
- ✓ Distribute the Hot Seat Activity handout to each student.
- ✓ Give a white board and marker to last student in each row.

#### **Directions:**

- The last student from each team comes up to teacher at front of the room and gets a slip of paper with the first problem on it.
- The student returns to seat and shares problem with other member of team. (Each team member writes problem 1 in box 1 on Hot Sheet Activity handout.)
- All students work out problem without talking. The last student writes solution on the whiteboard and others write solution on worksheet. (Student with white board writes HOT SEAT instead of problem solution on his/her worksheet.)
- The last student passes white board forward to student sitting directly in front.
  - This student checks the solution and if agrees, passes the white board forward for next student to check and pass forward. This whole procedure takes place in silence.
  - If a student disagrees with the solution, the white board is passed back to the original student to make corrections and pass forward again.
- When all students have agreed with the solution and passed it all the way to the student in the front of the row, front student holds up white board for teacher to check.
  - If correct, teacher gives student with white board the next problem.
  - If incorrect, white board is passed back again to last student and process repeats.
- All other students on team stand up, move one seat forward and sit down in new seat.
- Student with whiteboard and new problem goes to last seat in row and shares problem with team members.
- Repeat problem solving process until teacher decides that time is up. More able teams will do more problems, and less able teams will do fewer problems. All students will have the opportunity to do and check several problems for practice.

**Hot Seat  
Student Record Sheet**

Name: \_\_\_\_\_

**Directions:** Write each problem in the appropriate box. Solve the problem showing all work. If it is your turn to be in the "hot seat" write HOT SEAT in the box and show your work on the white board.

<b>1.</b>	<b>2.</b>
<b>3.</b>	<b>4.</b>
<b>5.</b>	<b>6.</b>



Find the slope of the line that passes through the two points.

**1.**     $(8, 5)$                        $(2, 3)$

---

**2.**     $(10, -3)$                        $(-4, 4)$

---

**3.**     $(-5, 6)$                        $(3, 0)$

---

**4.**     $(7, -2)$                        $(7, 5)$

---

**5.**     $(-6, -9)$                        $(0, 3)$

---

**6.**     $(-5, 2)$                        $(5, 2)$

Find the slope of the line that passes through the two points.

			Slope:
<b>1.</b>	(8, 5)	(2, 3)	$\frac{5-3}{8-2} = \frac{2}{6} = \frac{1}{3}$
<b>2.</b>	(10, -3)	(-4, 4)	$\frac{-3-4}{10-(-4)} = \frac{-7}{14} = -\frac{1}{2}$
<b>3.</b>	(-5, 6)	(3, 0)	$\frac{6-0}{-5-3} = \frac{6}{-8} = -\frac{3}{4}$
<b>4.</b>	(7, -2)	(7, 5)	$\frac{-2-5}{7-7} = \frac{-7}{0} \Rightarrow \text{undefined}$
<b>5.</b>	(-6, -9)	(0, 3)	$\frac{-9-3}{-6-0} = \frac{-12}{-6} = 2$
<b>6.</b>	(-5, 2)	(5, 2)	$\frac{2-2}{-5-5} = \frac{0}{-10} = 0$

**Steppin' It Up**  
**Slope Homework**

Name: \_\_\_\_\_

Determine the slope of the line that passes through the points given.

1.)  $(-5, -8)$   $(1, 10)$

2.)  $(7, 6)$   $(-2, 6)$

3.)  $(0, 9)$   $(2, -5)$

4.)  $(-2, 7)$   $(0, -5)$

5.)  $(0, 0)$   $(5, -6)$

6.)  $(-2, 5)$   $(4, -7)$

7.)  $(-8, 1)$   $(2, -4)$

8.)  $(2, 3)$   $(4, 5)$

9.)  $(-9, -4)$   $(-6, 8)$

10.)  $(1, -4)$   $(6, 6)$

**Steppin' It Up**  
**Slope Homework**

Name: \_\_\_\_\_ANSWER KEY\_\_\_\_\_

Determine the slope of the line that passes through the points given.

1.)  $(-5, -8) (1, 10)$

$$\frac{-18}{-6} = 3$$

2.)  $(7, 6) (-2, 6)$

$$\frac{0}{9} = 0$$

3.)  $(0, 9) (2, -5)$

$$\frac{14}{-2} = -7$$

4.)  $(-2, 7) (0, -5)$

$$\frac{12}{-2} = -6$$

5.)  $(0, 0) (5, -6)$

$$\frac{-6}{5}$$

6.)  $(-2, 5) (4, -7)$

$$\frac{-12}{6} = -2$$

7.)  $(-8, 1) (2, -4)$

$$\frac{-5}{10} = -\frac{1}{2}$$

8.)  $(2, 3) (4, 5)$

$$\frac{2}{2} = 1$$

9.)  $(-9, -4) (-6, 8)$

$$\frac{12}{3} = 4$$

10.)  $(1, -4) (6, 6)$

$$\frac{10}{5} = 2$$

## Warm-Up Lesson 3

Determine the slope of the line that passes through the two points given.

a.)  $(-3, -5)$   $(6, 4)$

b.)  $(0, 7)$   $(8, 3)$

---

## Warm-Up Lesson 3 – ANSWER KEY

Determine the slope of the line that passes through the two points given.

a.)  $(-3, -5)$   $(6, 4)$

$$m = \frac{9}{9} = 1$$

b.)  $(0, 7)$   $(8, 3)$

$$m = \frac{-4}{8} = -\frac{1}{2}$$

# Scavenger Hunt Activity

## Teacher Directions:

1. Print out the following answer/question sheets. Reorder the sheets and tape them up individually on the wall around the room. Make sure the answers are high enough so that they can be seen easily.
2. Copy the student answer sheet and distribute one to each student.
3. Students work by themselves or in pairs.
4. Teacher assigns one of the letters to each student and instructs him/her to start at that answer/question sheet.
5. Student(s) reads the question at the bottom of the sheet and determines the solution.
6. Student(s) looks around the room to find the correct solution on one of the other papers.
7. Student(s) moves over to the sheet with the correct solution and records the letter of that sheet on his/her answer sheet as well as the solution.
8. Student(s) continues until s/he returns to the starting point.
9. Student(s) raises hand and teacher checks the answer sheet. (The letters will be in the same order, although each student/group will start at a different letter in the list.)

A

2

—

3

What is the slope of the line  
that passes through the points  
 $(3, -4)$   $(1, 8)$ ?

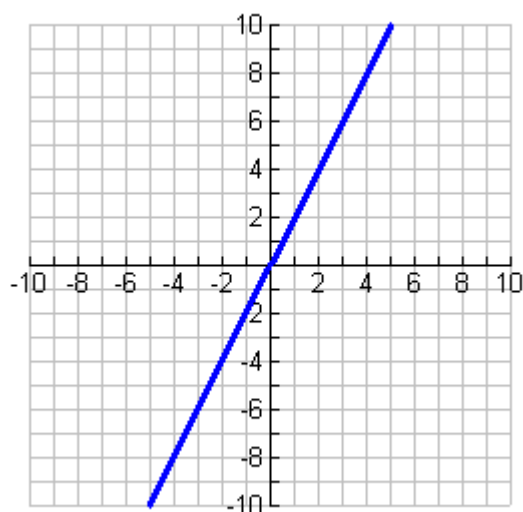
— 6

Which axis represents the  
"run" in  
"rise over run"?



$x$ 

What is the slope of the graphed line?

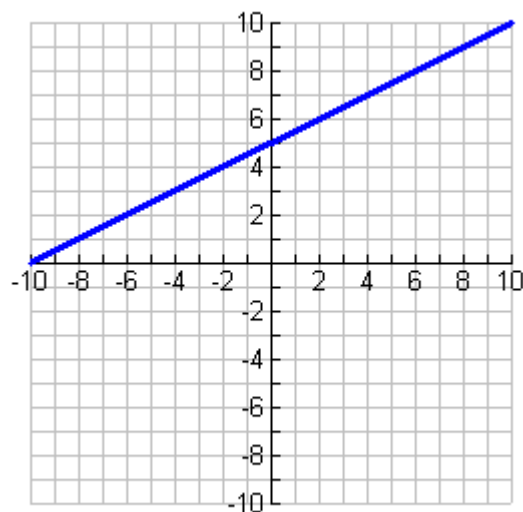


# 2

This is the type of slope when the line rises going from left to right.

# Positive

What is the slope of the graphed line?



$$\frac{1}{2}$$

What is the slope of the line  
that passes through the points  
 $(5, -2)$   $(1, 14)$ ?

$-4$ 

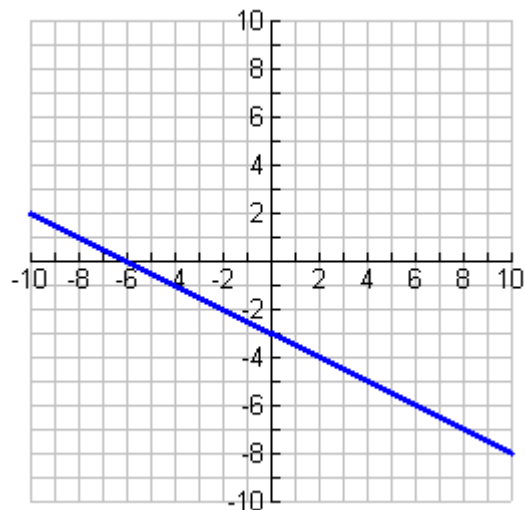
Which axis represents the  
"rise" in  
"rise over run"?

$y$ 

What is the slope of the line  
that passes through the points  
 $(6, -3)$   $(0, -9)$ ?

# 1

What is the slope of the graphed line?



$$-\frac{1}{2}$$

This is the type of slope when the line goes down from left to right.

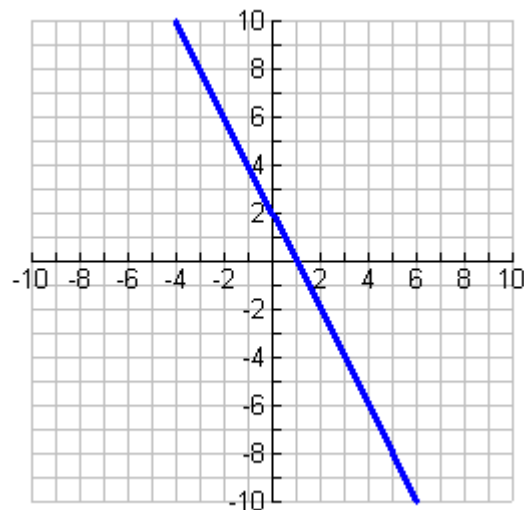


# Negative

What is the slope of the line  
that passes through the points  
 $(8, 3)$   $(5, 2)$ ?

$$\frac{1}{3}$$

What is the slope of the graphed line?



$-2$ 

This is the slope of a  
horizontal line.

# Zero

What is the slope of the line  
that passes through the points  
 $(6, -6)$   $(1, 9)$ ?

X

— 3

This is the slope of a vertical  
line.

# Undefined

This is a number that describes  
the steepness of a line.

# Slope

What is the slope of the line  
that passes through the points  
 $(-8, -4)$   $(10, 8)$ ?

**Scavenger Hunt  
Student Record Sheet**

Name: \_\_\_\_\_

	Letter	Answer to problem on bottom of sheet
START:		



**Scavenger Hunt  
Student Record Sheet**

Name: \_\_\_\_\_ANSWER KEY\_\_\_\_\_

	Letter	Answer to problem on bottom of sheet
<b>START:</b>	<b>A</b>	$\frac{2}{3}$
	<b>L</b>	-6
	<b>G</b>	$x$
	<b>E</b>	2
	<b>B</b>	positive
	<b>R</b>	$\frac{1}{2}$
	<b>S</b>	-4
	<b>M</b>	$y$
	<b>I</b>	1
	<b>N</b>	$-\frac{1}{2}$
	<b>K</b>	negative
	<b>U</b>	$\frac{1}{3}$
	<b>D</b>	-2
	<b>O</b>	zero
	<b>X</b>	-3
	<b>V</b>	undefined
	<b>T</b>	slope

## Slope Application

Name \_\_\_\_\_

1. A college freshman started the year with \$400 in spending money and after three months, she has \$280 left. Assume that she will continue to spend her money at this same rate.

a. Write 2 data points in the form ( month , amount of spending money) .

( \_\_\_\_\_ , \_\_\_\_\_ )

( \_\_\_\_\_ , \_\_\_\_\_ )

b. Determine the slope of the line that passes through these two points to find the rate of spending for this college freshman in dollars per month.

2. In 1990, the number of American Bald Eagles was estimated to be 3200 breeding pairs. In 1994, the estimate was 4000. Assume that the number of breeding pairs has increased at a constant rate since 1990.

a. Write 2 data points in the form ( year , number of breeding pairs) .

( \_\_\_\_\_ , \_\_\_\_\_ )

( \_\_\_\_\_ , \_\_\_\_\_ )

b. Determine the slope of the line that passes through these two points to find the rate of breeding for American Bald Eagles in number of breeding pairs per year.

**X Slope Application Key**

Name \_\_\_\_\_

1. A college freshman started the year with \$400 in spending money and after three months, she has \$280 left. Assume that she will continue to spend her money at this same rate.

a. Write 2 data points in the form ( month , amount of spending money) .

( 0 , 400 )

( 3 , 280 )

b. Determine the slope of the line that passes through these two points to find the rate of spending for this college freshman in dollars per month.

$$\frac{280 - 400}{3 - 0} = \frac{-120}{3} = -40$$

2. In 1990, the number of American Bald Eagles was estimated to be 3200 breeding pairs. In 1994, the estimate was 4000. Assume that the number of breeding pairs has increased at a constant rate since 1990.

a. Write 2 data points in the form ( year , number of breeding pairs) .

( 0 , 3200 )

( 4 , 4000 )

b. Determine the slope of the line that passes through these two points to find the rate of breeding for American Bald Eagles in number of breeding pairs per year.

$$\frac{4000 - 3200}{4 - 0} = \frac{800}{4} = 200$$

## Slope Quiz

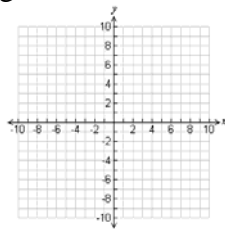
Name \_\_\_\_\_

### Part 1 Definition (7 pts.)

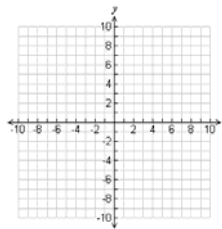
**Directions:** Complete the sentence with a word or group of words.

1. The slope of a line is determined by taking the number of units rising or \_\_\_\_\_ and dividing that by the number of units moving to the \_\_\_\_\_ or right.
2. The \_\_\_\_\_ axis is used in determining the rising units where the \_\_\_\_\_ axis determines the run units.
3. Sketch an example of a line that has the slope given:

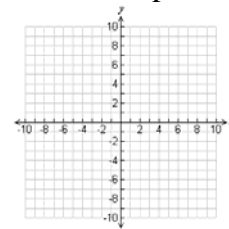
a) Negative



b) Zero



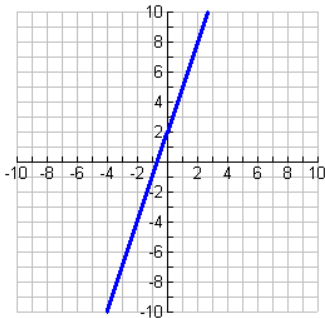
c) undefined slope



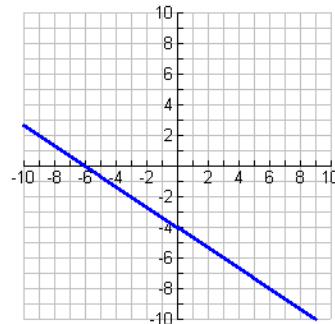
### Part 2 Graphs (8 pts.)

**Directions:** Determine the slope given a line on a graph. Show all work.

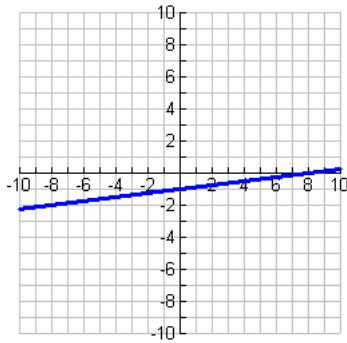
4.



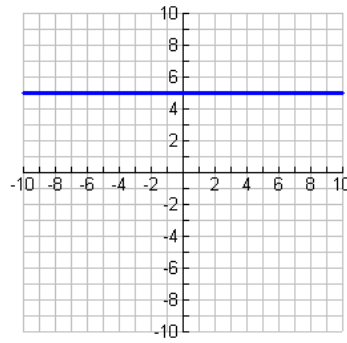
5.



6.



7.



**Part 3 (15 pts.)**

**Directions:** Compute the slope given two points. Show all work.

8.  $(6, 6)$   $(-2, -2)$  Slope \_\_\_\_\_

9.  $(2, -5)$   $(10, -5)$  Slope \_\_\_\_\_

10.  $(-3, 5)$   $(-3, 10)$  Slope \_\_\_\_\_

11.  $(7, 2)$   $(-4, -2)$  Slope \_\_\_\_\_

12.  $(-1, 1)$   $(5, -7)$  Slope \_\_\_\_\_

**Challenge (5 pts.)**

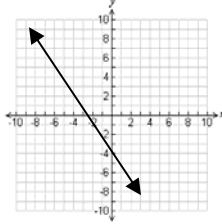
**Determine the slope. Show all work.**

13. A luggage ramp at the airport is 40 feet long and rises 24 feet. What is the slope of the ramp?

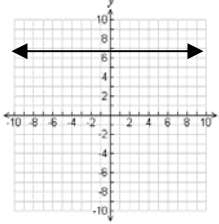
## Slope Quiz Key

### Part 1 Definition

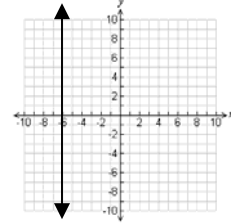
1. falling, left
2. y , x
3. negative



Zero



undefined



Ans. may vary

### Part 2 Graphs

4.  $m = 3$       5.  $m = \frac{-2}{3}$       6.  $m = \frac{1}{8}$       7.  $m = 0$

### Part 3

8. slope = 1      9. slope = 0      10. slope = undefined      11. slope =  $\frac{4}{11}$
12. slope =  $\frac{-4}{3}$       13. slope =  $\frac{3}{5}$

